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INTEGRATING MANAGEMENT BY OBJECTIVES AND ZERO-BASE BUDGETING:
A CASE STUDY

by

Ⓒ ERIC ANDRES MORGAN

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Zero-Base Budgeting: A Case Study"

submitted by Eric Andres Morgan
in partial fulfilment of the requirements for the degree of
Master of Business Administration

John Williams
Supervisor

Dated: April 15, 1983

To my wife and four children,
who understood and encouraged
me during the long year of study.

ABSTRACT

This thesis analyzes, based on a case study, the results of integrating Management by Objectives (MBO) and Zero-Base Budgeting (ZZB). The analysis centers around the test of three research hypotheses. These research hypotheses are based on the underlying theory utilized by various writers to suggest that MBO and ZZB can be effectively integrated. In terms of organization, the thesis introduces the topic and the three hypotheses, presents a selective review of the literature, describes the case background and the source of the information used, tests the three hypotheses and presents the conclusions that can be derived for the analysis.

Various writers, to whom the thesis makes reference, have stated that MBO and ZBB are two management processes that can be effectively integrated, providing an improved approach to planning, budgeting and controlling the undertakings of a business concern. Based on these references, the research hypotheses propose specific behaviors that should be expected when ZBB is introduced to an environment in which MBO is also used. Empirical evidence is used to test the hypotheses. The evidence was obtained through a questionnaire survey at a company which went through the above process. The reference case provides an excellent opportunity to analyze and compare perceptions about ZBB, given that the managers involved were almost evenly split between users and non-users of MBO, at the time ZBB was introduced.

The three research hypotheses can be summarized by the following statements:

1. The initial phase of ZBB - setting roles and objectives - should make a less significant contribution to previous MBO users, than non-users.

2. ZBB, as a budgetary process, should be more positively received by MBO users, than non-users.

3. MBO users should require less effort to learn and implement ZBB, than non-users.

The three research hypotheses are tested statistically against the null hypotheses stating that there should be no differences between MBO users and non-users on the above issues.

The statistical analyses performed demonstrate that none of the three research hypotheses can be favored. There is no indication that the expected behaviors were present at the reference organization; in fact, strong indications favoring the opposite behaviors are sometimes present. The conclusions indicate that the underlying theory utilized by various writers, on the issue of the integration of MBO and ZBB, may be wrong. The evidence strongly point toward the need for a new theory that could support the

formulation of different, maybe even opposite, research hypotheses. The development of this new theory is, however, beyond the scope of the thesis. The thesis attempts to identify some of the pitfalls that may exist in integrating MBO and ZBB. The conclusions are not a judgement of the potential contribution that MBO and ZBB can make to an organization. Rather, they simply demonstrate that the simultaneous use of these two processes is potentially awkward and, as such, their integration is by no means automatic. The contribution of this thesis is only on a small dimension of the potential sources of integration problems. Hopefully however, this contribution will be useful to other researchers examining related issues.

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I. INTRODUCTION

This thesis analyzes, based on a case study, the results obtained when two well known and tried management processes - Management by Objectives and Zero-Base Budgeting - are integrated.

Many writers, to whom this thesis will make reference later, have stated that Management by Objectives (MBO) and Zero-Base Budgeting (ZBB) are two management processes that can be effectively integrated, providing an improved approach to planning, budgeting, and controlling the undertakings of a business concern, in a more effective manner than each process can on its own.

At first glance this position appears reasonable, as both processes place their emphasis in establishing objectives, priorities, and plans to achieve results. McConkey (1965) describes the basic concept of MBO as "... an approach to management planning and evaluation in which specific targets for some length of time are established for each manager on the basis of the results which each must achieve if the overall objectives of the company are to be realized. At the end of this period, the actual results achieved are measured against the original goals; that is, against the expected results which each manager knows he is responsible for achieving".

In a very simplistic way, MBO can be depicted as a process for planning expected end-results (objectives), managing their implementation and subsequently controlling their achievement. The second chapter of this thesis provides a selective review of the literature on MBO.

ZBB, on the other hand, is defined by Phyrr (1972) as "... an operating planning and budgeting process which requires each manager to justify his entire budget request in detail from scratch (hence zero-base) and shift the burden of proof to each manager to justify why he should spend any money at all. This approach requires that all activities be identified in 'decision packages' which will be evaluated by systematic analysis and ranked in order of importance".

In essence, ZBB requires each manager to decompose his plans and budgets into small incremental pieces, identifying the costs and benefits associated with incremental levels of activity, service or effort. These incremental analyses are called decision packages. These packages are based on predefined objectives and agreed upon support to be received from, or supplied to, interfacing organizational units. Each package is a request for funds outlining what the manager wants to do, how much it will cost, the benefits to the organization and what will happen if it is not done. All packages are subsequently ranked in the order of priority dictated by the needs and goals of the organization and approved for implementation to the extent the organization can afford.

ZBB starts with the identification of desired end-results (objectives) and subsequently budget for the required resources to achieve them. ZBB links planning and budgeting, given that resources available to achieve planned objectives are always limited. Budgeting information is used to assess whether achieving the marginal portion of a planned objective is worth the cost (e.g. whether achieving the last 10% of an objective is worth 25% of additional cost). As such, the budgeting process in ZBB really starts with planning for desired objectives.

As with MBO, ZBB can also be depicted in a simplistic way as a process for planning expected end-results, allocating resources, managing their implementation and subsequently controlling their achievement; the added dimension is the budgeting approach that ZBB offers to facilitate the allocation of resources available. The incremental approach to budgeting that ZBB offers, provides a benchmark for analyzing the marginal contribution of planned objectives based on costs versus benefits. This added dimension is the cornerstone of ZBB. The second chapter of this thesis provides a selective review of the literature on the process.

Bhada and Minmier (1980) propose that "... The MBO and ZBB systems for planning and control can be integrated to provide an effective and efficient approach to the decision-making process. The practical limitations of MBO can be curtailed by capitalizing on the benefits of the ZBB approach, which is the logical technique to ensure that strategies, objectives and goals established in the MBO process are in harmony with the final budget". Migliore (1980), who also shares the above views proposes that ".....[ZBB and MBO] are ideally suited to being integrated together in a major planning effort to enhance organizational performance". The review of the literature, covered in the next chapter, identifies other writers who have expressed related views.

THESIS HYPOTHESES

Both MBO and ZBB claim to promote, and as such hopefully improve, communications between superiors and subordinates, leading to understanding and agreement on responsibilities, or roles, and objectives. From this common initial stage, MBO emphasizes activity planning, implementation and control. ZBB however, emphasizes the harmonization of objectives with budgetary allocations. Activity plans in ZBB fall into place as a result of budgetary decisions; those activities proposed in decision packages which are funded are implemented and provide the targets for control.

The literature appears to accept that MBO and ZBB can be effectively integrated, without a visible challenge of the underlying logic or theory supporting this conclusion. Given this situation, this thesis will test three hypotheses related to the integration of ZBB and MBO. These hypotheses will be tested using empirical evidences obtained following the implementation of ZBB in an organization where MBO was previously used by about half of the managers involved and where an attempt to link both processes took place. This case provides an excellent opportunity to analyze and compare the perceptions of MBO users and non-users about ZBB, establishing some conclusions about both processes' potential for integration. The three hypotheses and the basic arguments supporting them are:

First Hypothesis:

> "The initial phase of ZBB - setting roles and objectives - should make a less significant contribution to previous MBO users, than non-users".

This should be the case, given that MBO users should have already in place a clear understanding of their roles and objectives, which should be easily integrated into the ZBB framework. Readdressing roles and objectives for the purpose of implementing ZBB, should make a less significant contribution to previous MBO users, than that made to non-users. It can also be argued that there is a higher need and, as such, a higher contribution to be made, in improving communications, understanding and agreement on roles and objectives between superiors and subordinates, in groups where MBO is less used.

Second Hypothesis:

> "ZBB, as a budgetary process, should be more positively received by MBO users, than non-users".

This should be the case, given that if MBO and ZBB can be effectively integrated, ZBB should constitute a natural extension and enhancement to what MBO users are already doing. The ZBB budgeting process would provide the needed link between objectives and fund allocation required by MBO users (Bhada and Minmier, 1980). However, for those who have voluntarily opted not to use MBO, ZBB would be a significant change, requiring them to do things they have voluntarily opted out of in order to develop a budget and, as such, not as attractive.

Third Hypothesis

> "MBO users should require less effort to learn and implement ZBB, than non-users".

This should be the case, given that it can be reasonably argued that some individuals have a better predisposition toward planning than others and, presumably these individuals would adopt MBO on a voluntary basis, as was the case at the reference company. In addition, MBO users should be more used to structured planning processes and should have in place a clearer understanding of their roles and objectives. In contrast, budgeting is not done on a voluntary basis; it is a requirement. MBO non-users would have to start by adapting to structured planning, whether they liked it or not, and would have to initiate the objective setting process from a cold start, identifying, expressing, agreeing and documenting their roles and objectives.

SOURCE OF EMPIRICAL EVIDENCE

The empirical evidence used in this thesis was obtained from a company that would prefer to remain anonymous. The company is a wholly-owned subsidiary of a very large Canadian organization, which is in turn controlled by a Fortune 500 multinational corporation. Its main business is oil and gas exploration, development and production. The company is also involved, on a smaller scale, in the minerals business.

Following a pilot test of ZBB in 1980, the reference company introduced the process on a company-wide basis during the second half of 1981 for the preparation of their 1982 operating plan and budget. Long before the implementation of ZBB, the company had adopted an MBO process and had actively encouraged all management levels to use the process on a voluntary basis. At the time ZBB was introduced as the required format for developing the next year's plan and budget, about half of the line managers utilizing ZBB were also users of MBO. During the implementation of ZBB significant effort was spent in attempting to integrate the roles and objective setting approach of MBO into the ZBB framework.

A post-implementation review of the results obtained from the introduction of ZBB was conducted by the company during the first quarter of 1982. The results of this survey are the main source of empirical evidence in testing the above hypotheses. The survey asked line managers various questions related to their perceptions about the contribution made by ZBB and, also, about their MBO usage patterns. This information was obtained through a structured questionnaire administered to all line managers involved. The raw data was provided to the thesis writer by the company's management, understanding it was going to be used for a thesis study.

ORGANIZATION OF THE THESIS

In addition to this Introduction, there are four chapters in the main body of this thesis. Chapter II includes a selective review of the relevant literature on MBO and ZBB, including a description of the main characteristics of both processes, their similarities and differences and some references about their integration. Chapter III provides some background about the organization, the questionnaire survey used to gather the empirical evidence, the background and extent of the use of MBO and the implementation process used for ZBB. Chapter IV tests the three hypotheses based on the empirical data available and provide evidence regarding the extent to which they can be supported. Chapter V present the conclusions that can be derived from the analysis. Various appendices, as identified in the table of content, include the questionnaire, the tabulation of results and the statistical information supporting the test of hypotheses.

II. LITERATURE REVIEW ON MBO AND ZBB

This chapter examines the concepts of management by objectives (MBO) and zero-base budgeting (ZBB) based on a selected review of the literature available about the topic. First, the main characteristics of both processes are described. Subsequently, their similarities and differences and some documented references about their integration are discussed. This chapter provides the basic concepts necessary to understand the hypotheses, their analysis and the conclusions.

MANAGEMENT BY OBJECTIVES

MBO, as its name implies, is an objectives-oriented approach to management. Odiorne (1965) describes the basic concept as "... a process whereby the superior and subordinate managers of an organization jointly identify its common goals, define each individual's major area of responsibility in terms of results expected of him and use these measures as guides for operating the unit and assessing the contribution of each of its members". A similar definition by McConkey (1965) is provided in the introductory chapter. There are almost as many different 'approaches' to MBO as there are users, writers and practitioners in the subject. Many have made, or claimed to have made, their own 'improvements' to the process. A review of the literature suggests a number of elements that are generally present in these approaches (Odiorne, 1965; Humble 1967; Reddin, 1971; McConkey, 1965; Simpkins, 1966). Most of the differences between approaches are, in the writer's opinion, a matter of emphasis or 'mechanics' used to address these elements. These elements are:

- In many instances MBO programs start with a complete review and definition, or redefinition as the case may be, of the 'role' of each position (i.e. the purpose for its existence and the responsibilities assigned to it).
- Objectives are established for 'positions'. The main idea is to identify and decide what the individual in a position is required to achieve.
- Objectives are established for the 'key results areas', or 'effectiveness areas', of each position. These are areas where the main output requirements of a position are concentrated, as defined by its role.
- Both superior and subordinate participate in the 'objective-setting process'. Some writers go as far as to suggest that MBO is a contract between a superior and his subordinate.

- Many MBO systems include a process to 'link' common objectives, or parts of plans, that must fit together.

- The emphasis is on establishing objectives that are 'measurable or at least observable' at some point in time. Objectives which attainment cannot be measured or observed cannot be controlled, and hence managed, to produce the desired results.

- A 'recycling system' to review, periodically, the progress toward the attainment of the objectives, to take corrective actions and to set new objectives is generally present.

- A framework to help individual managers to produce a 'plan of action', which facilitates managing their activities toward the achievement of agreed objectives, is generally present.

- The 'performance appraisal' system is, in some instances, directly or indirectly related to the MBO program.

- The 'reward system' is, in some instances, directly or indirectly related to the MBO program.

- Some MBO systems place significant importance on the 'motivational and participative spin-offs' that the process can generate. In some instances the perceived benefits from these by-products of the program are as important as the objectives themselves.

The objectives-oriented concept of managing is certainly not new. It has been present in most techniques used to manage all kinds of operations. The definition of organization structures, the establishment of marketing plans, the use of production controls, the salary administration programs and many other processes normally used in management have an objectives-oriented emphasis. Historically, the concepts of MBO go back to the mid fifties when Peter Drucker (1954) predicted that future managers would be held accountable for results rather than for their activities or the pattern of their human relations. Drucker saw the managerial role as being accomplished when the manager (1) set objectives, (2) organized, (3) motivated and communicated, (4) developed people, (5) measured results.

Peter Drucker's contribution touched off a whole round of thinking, out of which emerged the management by objectives concept. The aspect which was new about MBO was that it established a complete methodical approach to planning and management and to the evaluation of what is accomplished, by defining the objectives expected up-front and orienting the activities to their attainment.

It also offered a systematic approach to the translation of the goals of the organization into attainable objectives for individual managers.

MBO evolved from a behavioral emphasis on delegation, appraisal and self-control (Keys and Bell, 1979). McGregor (1960) suggests that relating individual and organizational goals satisfies the ultimate objective of individual self-control. He suggests that people will exercise self-direction and self-control in the attainment of organizational goals to the degree that they are committed to them. Appraisal based upon such interpreted goals, McGregor argues, would be superior to traditional performance appraisal methods, because it would shift the emphasis from identification of weaknesses to an analysis of strengths.

ZERO-BASE BUDGETING

ZBB is a management process for planning, budgeting and controlling discretionary activities and related costs (MacIntosh, 1980). The process requires each manager to decompose his plans and budgets into small incremental pieces, identifying the costs and benefits associated with incremental levels of activity, service or effort. These incremental analyses, called decision packages, are based on predefined objectives and agreed upon support to be received from or supplied to interfacing organizational units. Each package is a request for funds outlining what the manager wants to do, how much it will cost, the benefits to the organization and what will happen if it is not done. All packages are subsequently ranked in the order of priority dictated by the needs and goals of the organization and approved for implementation to the extent the organization can afford.

MacIntosh (1980) emphasises that ".... the foremost aspect of ZBB to understand is that it is appropriate only in the areas of discretionary or managed costs". Further, he defines these areas as those ".... for which the optimal relationship between output (results) and inputs (resources consumed) is not known. The main reason for this is that outputs for discretionary cost centres are extremely difficult to identify, let alone quantify" .... "the optimum cost for any given result cannot be scientifically determined" ... "the 'correct' amount of spending for these activities is a matter of judgement and discretion". Variable costs, related to discrete units of output or throughput are clearly not conducive to ZBB. Phyrr (1973), who pioneered the concept of ZBB makes this distinction clear, eliminating from the domain of the process all those costs which are conducive to "standard-setting". State-oriented elements such as assets, liabilities and equities, as well as revenue activities, are also outside of its domain (Williams, 1981).

The process focuses on building a budget from the ground up. The budget amount to be allocated to each group within the organization is determined by:

- The relation between costs and benefits at various 'incremental' levels of activity, starting from no activity (hence, zero-base).

- The relative importance of performing the various proposed incremental activities, when all 'proposals' are ranked in order of priority.

- The 'funding' decision, reached by establishing a cut-off point for the ranked proposals. This cut-off point determines which proposals are funded and which are not.

As with MBO, there are almost as many different 'approaches' to ZBB as there are users, writers and practitioners on this field. However, a review of the literature suggests a number of elements that are generally present in these approaches (Cheek, 1977; Knight, 1979; Phyrr, 1973; Tourangeau, 1979; Rubinyi, 1980). Many of the differences between approaches are, in the writer's opinion, a matter of emphasis or 'mechanics' used to address these elements. These elements are:

- The initial requirement of ZBB is to identify and define the 'roles and objectives' of the groups involved (i.e. the 'decision units').

- Objective setting is generally 'top-down', starting with senior management defining the major goals and strategies for the following year. This information 'cascades' down through the organization in successively greater levels of detail pertinent to the various organizational groups. At the end of this stage, each decision unit have a detailed statement of objectives. These objectives identify the specific end-results that each group must achieve in order to support the overall goals and strategies of the organization. Funding at this stage is not a constraint; final objectives (those that will be persued) are decided by the funding decision at the end of the process.

- Many ZBB systems include a process which links common objectives, or parts of plans, that must fit together. This process is sometimes known as 'cross impact analysis'. Tourrangeau (1979) sees this stage as an opportunity to sort out and quantify which groups are doing what for whom in the organization, eliminating duplicated, redundant or unwanted activities, even prior to the actual preparation of decision packages.

- The cornerstone of ZBB is the preparation of a series of 'decision packages', outlining the incremental levels of activity, service or effort that each decision unit proposes to undertake. These packages can be described as benefits versus costs analyses of available opportunities for expenditures at each decision unit; they also constitute a request for funds. Cumulatively all packages for a decision unit allow the group to fulfill all the initially set objectives.

- The packages are 'ranked in order of priority'. This process is 'bottom-up', starting with the individual decision unit managers ranking their packages. Subsequently, the ranked packages are merged into a progressively larger set. This is accomplished by having the 'peer managers' establish the order of priority of the merging packages as they move up through the organization. At the end of this stage, there is a ranked list of packages, generally for the entire organization, that senior management can use in the next stage -- making a funding decision.

- The 'funding decision' or, in other words, the allocation of budget amounts to each decision unit, is made by reference to the ranked packages. This decision is based on what the organization can afford to spend and, also, on the analysis of the implications of various funding levels (i.e., implications of not funding the sub-set of packages that would be left out at any given funding levels).

- The traditional 'line-item budget' for each decision unit is produced by extracting, from the approved packages for each unit, the expense budgets on a line-item basis.
- During the year, as the plan and budget is being implemented, 'control' can be exercised on budgets versus actual expenditures and, also, on objectives achieved versus objectives funded through the budget allocation process.

The concepts used by ZBB have long been known. However, they were largely ignored until Peter Phyrr started spreading the word about his initial experiences with the process at Texas Instruments Inc., in the late 1960's. Phyrr's contribution was to formalize into a methodology a series of independent, sometimes loose, management practices (e.g., planning, objective setting, cost/benefit analysis, incremental analysis, priority ranking, traditional budgeting techniques and others). During the seventies ZBB became a management 'buzz' word and numerous articles and books were written about it. Given its visibility, it is not surprising to find in the literature that opinions about the process range from "a useless fraud", to, "one of the most important contributions to modern management". Despite the praise and criticism, real or alleged, the number of users appear to be growing (Tourangeau, 1979). Williams (1981) attributes this growth to "... the increasing inability of managers to cope with discretionary costs which are 'strangling' budget planning and resource allocations in the public sector and 'squeezing' profits in the private sector".

SIMILARITIES AND DIFFERENCES

Several similarities and differences, which are material to the hypotheses at hand, are present in MBO and ZBB. Both processes are objectives-based, that is, they establish the direction of activities in terms of the results that these activities should achieve. MBO is a process for planning expected end-results (objectives), managing activities during their implementation and subsequently controlling their achievement. ZBB on the other hand, starts with the identification of desired objectives, and subsequently budgets for the required resources to achieve these objectives. Although both processes are objectives-based, the emphasis of these objectives is, however, somewhat different. MBO emphasizes the personal objectives of each employee in the group, while ZBB is more concerned with departmental and organizational objectives (Greenhouse, 1973).

Both processes promote communication and understanding between superiors and subordinates on what are the expected end-results of the efforts to be undertaken. MBO, however, does this on a more personal and individual basis, while ZBB takes a more cross-departmental view (Keys and Bell, 1979).

MBO and ZBB recognize the need to link objectives of interfacing parties. MBO accomplishes this with emphasis on ensuring that individual plans are in harmony. ZBB, on the other hand, employs a "show me" attitude; the emphasis in ZBB is on identifying duplicated, redundant or unwanted activities in the plans of the interfacing groups (Tourrangeau, 1979).

MBO and ZBB recognize the need to plan for the activities that will facilitate achieving the desired results. The emphasis on MBO is on providing the individual with a plan of action. In ZBB this intention is also present, with the emphasis on groups and not individuals, however. The main difference is that decision packages, which provide the framework for the group's plans, are also requests for funds, and, as such, they may overemphasize the 'sale-effort' that the manager, consciously or unconsciously, put into them.

In MBO, final objectives are shaped as a result of discussions and agreements between superiors and subordinates. The issues at hand in shaping these objectives include the availability of resources to undertake the activities necessary to achieve them; objectives are resource-constrained. In ZBB, however, the initial emphasis is on identifying the maximum challenge that a group can constructively undertake; objectives are constrained only by the perceived contribution that they can make. The funding process in ZBB sorts out which objectives, or portions thereof, are to have resources allocated to them.

REFERENCES ABOUT THE INTEGRATION OF MBO AND ZBB

Many authors have made reference to the potential for 'integrating' MBO and ZBB. Migliore (1980) proposes that these two processes are ideally suited for being integrated into a major planning effort to enhance organizational performance. Bhada and Minmier (1980) also propose that the integration of these two processes provide a more effective approach to decision-making. Cheek (1977), referring to the Texas Instrument experience on this subject, states that ".... [their] system called 'Objectives, Strategies and Tactics' (OST) ... linked MBO and long-range planning with zero-base budgeting. In so doing, broad pre-agreed affordable objectives and strategies could be readily translated into a tactical operating budget". This example is further supported by Vancil (1972). He refers to the same Texas Instrument experience and states that "... In a sense, the goal-setting structure which is reflected in our TAP's (tactical action plans) is not greatly different from a 'Management by Objectives' system ... The big difference is that our TAP's are integrated into the planning and budgeting systems". Connel and Schoonover (1979), referring to their experience implementing ZBB at Alcan Aluminum Corp., state that ".... [ZBB] meshed well with other phases of planning .... enhancing the company's MBO program". The case of Genrad Inc. (1976) refers to General Radio's experience developing ".... an interesting approach involving both MBO and ZBB. The alignment of management systems at Genrad is unique in that MBO and ZBB are explicitly integrated at the time of implementation, not in an evolving manner".

The issue of integrating MBO and ZBB is not new. The above references are just a sample from a selected review of the literature. None of the above references explicitly states, however, what is to be understood by 'integrating' both processes. The thesis writer belives that this is a key issue that has not been thoroughly addressed. Integrating both processes in the above contexts may mean anything from making one system out of two, to simply having two independent processes benefiting mutually by the cross-fertilization of ideas that result from their parallel use.

III. RELEVANT BACKGROUND

This chapter provides background information useful to the analysis of the thesis hypotheses. Relevant background is provided about the reference organization, the questionnaire survey used to gather the empirical evidence, the extent of MBO usage at the reference organization and the ZBB implementation process.

THE ORGANIZATION

The Company, briefly described in the introductory chapter, was comprised of four operating departments, one major support department and a number of corporate departments and groups. The operating departments were responsible for the four major business segments of the organization (i.e. exploration for oil and gas, production of oil and gas, minerals resources exploration and exploitation and heavy oil exploration, development and production). A major support department was responsible for research and technology development for all business segments. The remaining departments and groups were engaged in providing corporate support services to all departments, in areas like finance, accounting, human resources, external affairs, general services, law, tax and others. At the senior level the reporting relationships were somewhat complex. However, for practical purposes the organization can be depicted as comprised of six departments. This simplification, which is consistent with the way the survey data is organized, is presented in Figure 3.1.

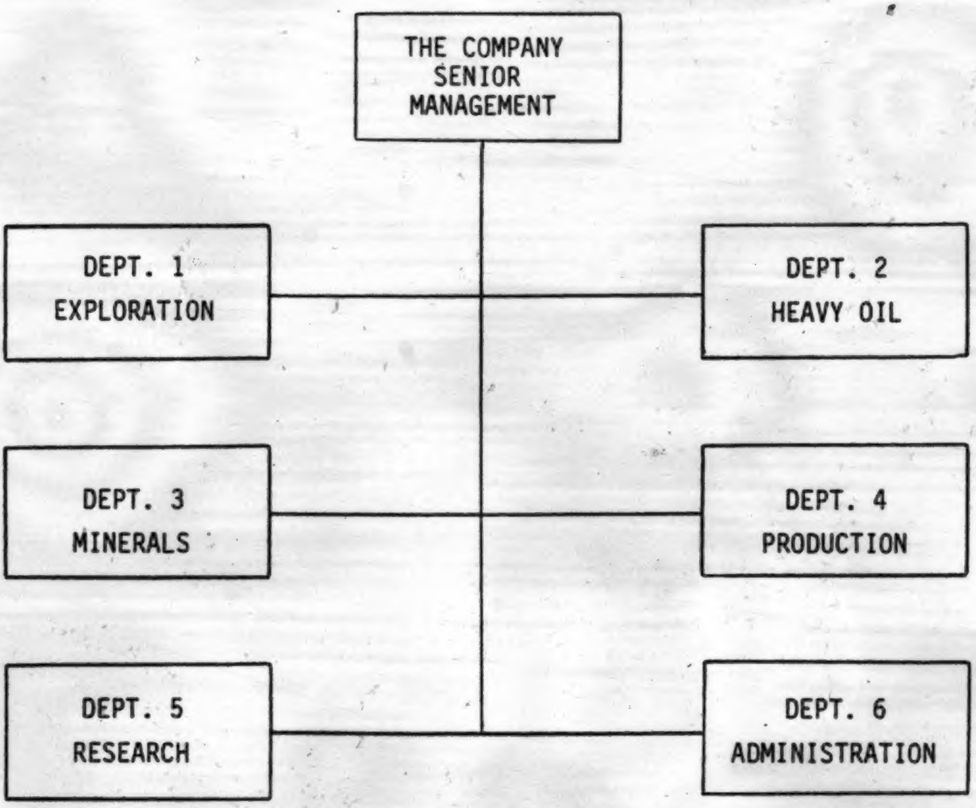

THE COMPANY SENIOR MANAGEMENT
DEPT. 1 EXPLORATION
DEPT. 2 HEAVY OIL
DEPT. 3 MINERALS
DEPT. 4 PRODUCTION
DEPT. 5 RESEARCH
DEPT. 6 ADMINISTRATION

Figure 3.1 Reference Company Organization

During the late 1970's the company, similar to many others in the industry, grew at a remarkably fast pace. In the three years prior to the end of 1981, the company doubled in staff. Total operating budget, excluding capital investments, was in the five hundred million dollars order of magnitude. During this period of high growth the management emphasis centered on managing the 'capital program' - basically comprised by the investments in land, exploration, development and production facilities. Ongoing capital program projects during the period of high growth were well into the billions of dollars. During this period, however, limited effort was spent in reviewing the effectiveness of operating expenditures.

The National Energy Program introduced by the federal government in the fall of 1980 and the subsequent oil pricing agreement reached by the federal government and the Province of Alberta in 1981 made it quite clear to the organization that improving their management capabilities on operating costs was essential to remain profitable.

In looking for alternative approaches to improve the organization's management capability on operating costs, ZBB was selected given some limited, but successful, experience with the process on a test basis.

Based on the surveys of results, which followed the first company-wide implementation of ZBB, senior management concluded that there were enough positive indications to justify retaining it as an ongoing planning and budgeting process. Retaining MBO was never in question, because it was perceived that, for those that used it, the process was producing positive results.

THE QUESTIONNAIRE SURVEY

The questionnaire survey was conducted by the company's management in order to identify the users' perceptions about the contribution made by ZBB. The objective was to decide on the future usage of ZBB and to identify areas requiring enhancements, if it was to be used again. The survey included the line managers, otherwise known as the decision unit managers, who had done the bulk of the work using ZBB. The survey was conducted in December of 1981, shortly after the completion of the planning and budgeting process, but prior to senior management making the final funding decisions for the 1982 budget. The reason for this timing was to avoid distortions of perceptions, about ZBB, resulting from the level of funding obtained. A total of 148 questionnaires were sent to decision unit managers, receiving 121 responses. A second and significantly simpler survey of upper and middle management was conducted in February 1982, after the final ranking and funding decisions had been completed. Some distortions of perceptions resulting from the level of funding obtained by each group is present in this second survey. This is particularly possible with middle managers, who may have tended to identify closer with the needs and priorities of their own groups, rather than with the global needs and priorities of the organization. The results of this survey are not particularly relevent to the hypotheses at hand anyway, because they are generic to the overall ZBB process, without any reference to the integration of MBO and ZBB. As such, these results are not used in this thesis.

The division used to pilot-test ZBB the previous year was excluded from the company-wide survey. The decision to exclude this division was based on the fact that they had followed a somewhat different path in implementing ZBB given their operating characteristics, which included basically field operations with a widespread geophysical dispersion.

The questionnaire attempts to measure, on a scale from 1 to 5, the managers' perceptions about the contribution of ZBB in general and also for each specific stage of the process. Information is also gathered on related issues, such as, total hours spent working with ZBB, in learning the process and in documentation activities. In addition, the questionnaire asked each decision unit manager to estimate the hours that would be required to repeat the process the following year.

Many questions contain useful information to analyze and test the hypotheses at hand. The first three questions, however, are the ones which facilitate segregating the perception of MBO users and non-users about ZBB. These three questions facilitate analyzing the managers' perceptions about ZBB, by breaking them down into groups, based on

- whether MBO was previously used or not,
- whether MBO was used within the framework of ZBB,

- whether the managers intended to use MBO in the future, and
- combinations of the above three issues.

The questionnaire and the tabulation of the responses relevant to the thesis are attached as Appendices A and B, respectively. A further explanation about the information content of each question and its usefulness for this thesis is included in the fourth chapter under the heading 'Independent Variables' and 'Criterion Variables'.

MBO BACKGROUND

MBO was introduced to the organization during the seventies, under the name of Management of Results. The introductory effort was conducted by a group of internal consultants who made one of their main objectives the support of this activity. The group had trained a very large portion of the organization's management levels by the time ZBB was introduced. This had been accomplished by offering internal training programs, direct support to users and by getting senior management to endorse the usage of MBO as a desirable business practice. Some managers, however, had used MBO and subsequently had dropped it. Statistics are not available on how many of the managers adopting ZBB had been previously trained on MBO. From the survey results, however, it is known that out of the 121 respondents, at the time ZBB was introduced, 48.8% were previous MBO users, 46.3% were non-users and

5% provided no response. It is the thesis writer's belief, based on his numerous discussions with many of the managers involved, that many MBO non-user-managers had been exposed to MBO at one time or another, but had not adopted the process on a continuous basis (probably as high as half of the respondents identifying themselves as non-users).

The adoption of MBO by each manager was voluntary, but in the thesis writer's opinion, based on his discussions with members of management, the decision was sometimes influenced by the degree of senior management commitment to the process in each group. The extent of usage also varied between groups. It is fair to say, however, that most users did a fairly good job at identifying and planning objectives using the MBO process, with most of the variations being on the follow-up during implementation and subsequent control of achievements.

An internal publication at the reference organization identified the process as ".... An approach to management .... a disciplined process of management that has the following basic steps:

1. Establishing the critical performance areas called 'Key Results Areas' through job understanding.
2. Setting objectives in each Key Result Area for a specific time period.
3. Organizing resources for achievement (Selecting the Plans of Action).

4. Implementing the Plans of Action.
5. Controlling the future through feedback of results."

Further, the internal publications identify the ".... distinctive characteristics of [the company's version of MBO] as:

1. The emphasis on job responsibility as a base for objective setting.
2. The emphasis on RESULTS as opposed to 'Activities'.
3. The concentration on the high priority objectives.
4. The emphasis on the planning and control relationship between a man and his boss.
5. Recognition of 8 key interlocking relationships (i.e., the individual and his boss, his subordinates, his peers, his suppliers/contractors, his customers, the government agencies, the competion and other organizations/persons)".

The process made use of specially designed forms and guidelines. Emphasis was placed on the output resulting from the interactions between interlocking parties, in order to identify end-results and manage to achieve the desired results.

ZBB IMPLEMENTATION

ZBB was pilot tested in the fall of 1980. The objective was to conclude whether ZBB as a planning and budgeting process was useful for operating activities and related expenditures. The perceived success of this pilot project, plus some other smaller experiences available from other areas of the parent company, led senior management to conclude that the process should be tried company-wide.

Prior to the company-wide implementation of ZBB during 1981, a detailed planning and preparation phase set the stage for smoothing its introduction. During this phase, emphasis was placed on ensuring that ZBB would effectively relate to other management processes already in place, such as, long term planning, MBO, the capital program budget and the accountability reporting process. Detailed implementation planning took place and the training effort was thoroughly organized. ZBB and MBO were perceived as having a large degree of overlap in the front-end setting of objectives. However, because not all managers were MBO users, the company decided to offer to all managers an option between a free format for setting objectives or the MBO procedure and format. The free format option was comprised by some very general guidelines, basicly requesting each decision unit manager to document in the structure of their preference, the overall role of the unit and a statement of the anticipated objectives for the key areas of output of the group. These objectives had to identify the maximum challenge that the group was prepared to undertake, without the constraint of resources. In addition, they had to relate to the overall strategy and corporate goals identified by senior management and the statement of objectives prepared by middle management in support of the corporate strategy and goals. The MBO format option basicly requested each manager to prepare, or review if available, a definition of the role and objectives using the various forms, procedures and structure provided by MBO. These objectives also had to be developed without the constraint of resources, taking into account the corporate strategy and goals established by senior management and the statement of objectives prepared by middle management, in support of the corporate strategy and goals. The objectives initially developed by each manager, in either format, were discussed in "peer group sessions" and agreed with superiors. The instructions provided to all managers identified the MBO format as highly desirable and, in fact, emphasized that ".... ZBB is not a replacement for our previous planning and budgeting process", ... "it effectively builds upon our existing process", ... "[ZBB makes] formal reference to MBO ....". The instructions, however, did not addressed the issue of how managers were to reconcile personal and group objectives, or the lack of a constrain on resources, using the MBO format. One implicit assumption related to the first issue may have been that the manager's objectives represent the groups' objectives. The expectation was that by having the opportunity to use MBO, most on-going users, and many non-users, would pursue this option and hopefully carry through with its usage. This was not only highly desirable, but also consistent with the intention to retain MBO as an ongoing feature of the organization management processes.

At the end of the planning and preparation phase some portions of organizations were excluded from ZBB for reasons other than applicability (e.g. the continuation of a major project was in question, a mine was going through a lengthy labour dispute which was expected to continue for some time, etc.).

The implementation started with a company-wide one-day training program of about 230 members of the various management levels of the organization, in groups of ten to twenty. Numerous detailed examples of the ZBB methodology developed during the preparation phase were used during the training sessions. The examples selected in each session were the ones that most closely resembled the operations and activities of the group being trained.

Following the completion of the training program, the various phases of ZBB were performed under a tight schedule and close coordination. A project team, comprised of company staff and consultants, supported the efforts of line managers during the preparation of the plans and budgets using ZBB and subsequent activities, by senior management, analyzing and consolidating the information at corporate levels. The division used to pilot-test ZBB the previous year used internal resources to support the implementation efforts, given their experience with the process.

IV. TESTS OF HYPOTHESES

The responses provided by decision unit managers to the questionnaire survey are the main source of information used in testing the three hypotheses at hand. The survey data available can be analyzed by breaking down the responses into sub-groups. These sub-groups are determined by the respondents' previous usage of MBO, the format used for setting roles and objectives in ZBB, the intentions of using MBO in the future, and some additional sub-groups resulting from combinations of these variables (e.g., the sub-group of previous MBO users which used the free format with ZBB).

This chapter begins by analyzing the information available from the questionnaire survey and its contributions to the test of the three thesis hypotheses. An explanation of the statistical procedures used for the test of hypotheses follows. Subsequently, the chapter takes one hypothesis at a time and presents a detailed statistical analysis, providing evidence regarding the extent to which the hypotheses can be supported. The Statistical Package for the Social Sciences, SPSS, Version H , Release 8.0 for MULTICS/6880 available at the University of Calgary used to produce the various statistical analyses. Relevant printouts are attached as appendices, and quoted when necessary.

INDEPENDENT VARIABLES

The first three questions of the survey of decision unit managers provides the information necessary to break down the remaining questions into sub-groups with certain known characteristics about MBO usage. These three questions, plus some combinations of them, as explained below, are the 'independent variables' used to analyze the remaining questions or 'criterion variables'.

These three questions are (see the questionnaire in Appendix A for further detail):

Question 1: Did you use the MBO process prior to the implementation of ZBB? - Response options were Yes or No.

Question 2: Did you use the MBO format or the free format (the option available with ZBB) for the preparation of your roles and objectives? - Response options were MBO or Free.

Question 3: Do you intend to use the MBO process in the future? - Response options were Yes or No.

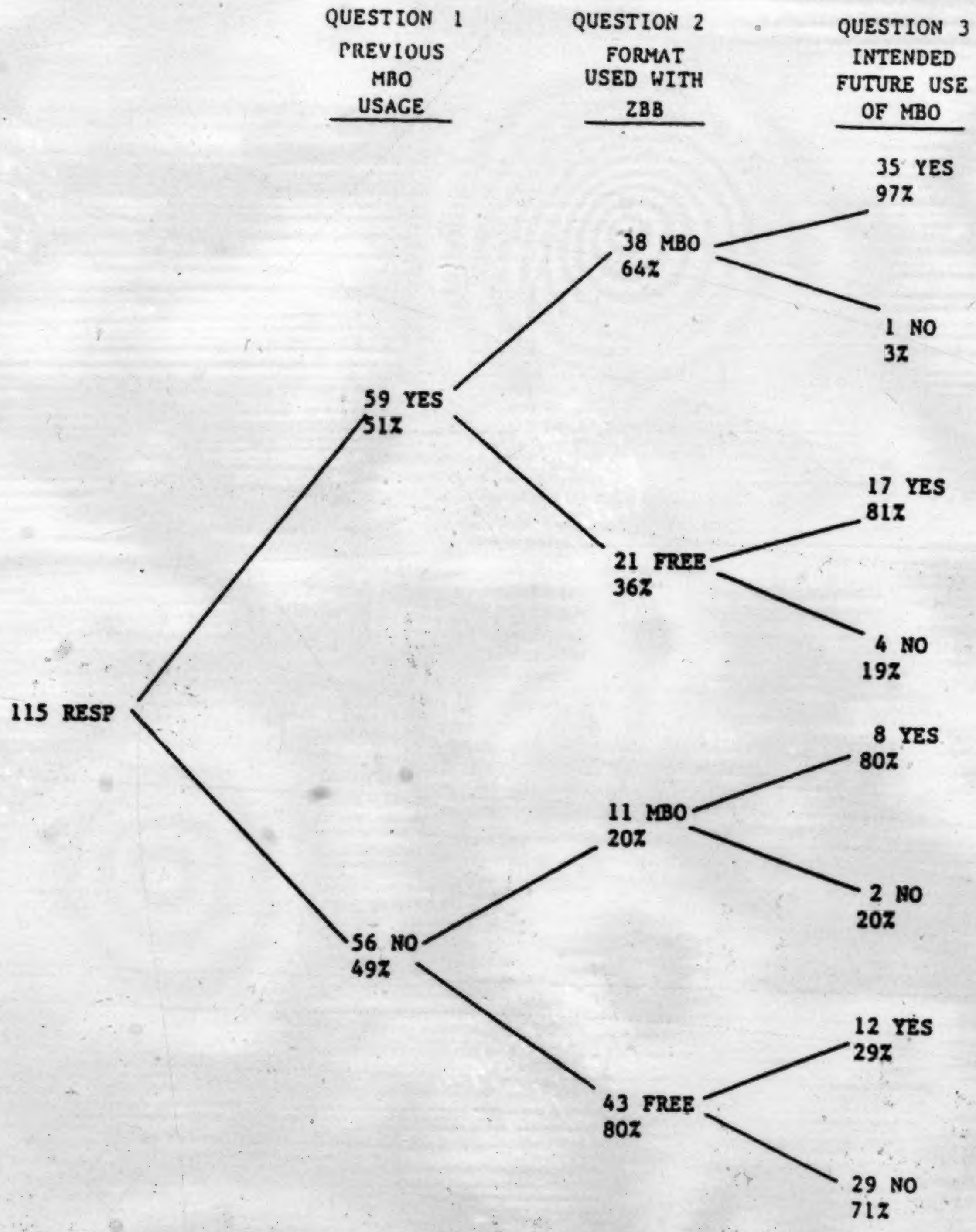
The responses to these three questions, and the resulting differences between previous MBO usage and MBO usage with ZBB, and previous MBO usage and expected future usage, are presented in Figure 4.1. When the relationships between individual responses are analysed, the break down depicted in Figure 4.2 results. The information provided in Figures 4.1 and 4.2 support the following observations.

	xxxxxQUESTION 1xxxxx			xxxxxxxxxxxQUESTION 2xxxxxxxxxxx				xxxxxxxxxxxQUESTION 3xxxxxxxx			
	PREVIOUS MBO USAGE			FORMAT USED WITH ZBB				INTENDED FUTURE USE OF MBO			
ORG. UNIT	YES	NO	N/R	MBO	VAR1	FREE	N/R	YES	VAR2	NO	N/R
UNIDENTIFIED	2	4	1	2	-	4	1	4	+2	2	1
DEPT. 1	6	13	-	9	+3	10	-	8	+2	10	1
DEPT. 2	8	1	-	5	-3	4	-	7	-1	2	-
DEPT. 3	2	5	-	3	+1	4	-	4	+2	2	1
DEPT. 4	16	10	3	12	-4	15	2	19	+3	6	4
DEPT. 5	6	4	1	3	-3	8	-	5	-1	3	3
DEPT. 6	19	19	1	16	-3	21	2	26	+7	11	2
TOTALS	59	56	6	50	-9	66	5	73	+14	36	12
RELATIVE %'s	48.8	46.3	5.0	41.3	-7.5	54.5	4.1	60.3	+11.5	29.8	9.9
ADJUSTED %'s	51.3	48.7	-	43.1	-8.0	56.9	-	67.0	+15.7	33.0	-

VAR1 = POSITIVE OR NEGATIVE VARIATION BETWEEN THE NUMBER OF PREVIOUS MBO USERS (I.E. THOSE RESPONDING "YES" TO QUESTION 1) AND THOSE USING THE MBO FORMAT WITH ZBB (I.E. THOSE RESPONDING "MBO" TO QUESTION 2).

VAR2 = POSITIVE OR NEGATIVE VARIATION BETWEEN THE NUMBER OF PREVIOUS MBO USERS (I.E. THOSE RESPONDING "YES" TO QUESTION 1) AND THOSE INTENDING TO USE IT IN THE FUTURE (I.E. THOSE RESPONDING "YES" TO QUESTION 3.)

FIGURE 4.1 MBO USAGE


QUESTION 1
PREVIOUS
MBO
USAGE
QUESTION 2
FORMAT
USED WITH
ZBB
QUESTION 3
INTENDED
FUTURE USE
OF MBO
115 RESP
59 YES
51%
56 NO
49%
38 MBO
64%
21 FREE
36%
11 MBO
20%
43 FREE
80%
35 YES
97%
1 NO
3%
17 YES
81%
4 NO
19%
8 YES
80%
2 NO
20%
12 YES
29%
29 NO
71%

NOTE: Some small numerical differences with Figure 4.1 are due to table-wide deletion of missing data (no responses).

FIGURE 4.2 BREAKDOWN OF MBO USAGE

- In total, 59 respondents (51%) were previous MBO users and the remaining 56 respondents (49%) were non-users. By departments, the proportion of users to non-users varies somewhat, especially in the smaller departments (e.g., dept. 2 where 8 out of 9 respondents were previous MBO users), but tend to be evenly distributed for the larger departments (e.g., dept. 6 where 19 respondents were MBO users and 19 were non-users).

- Previous MBO users preferred using the MBO format in conjunction with ZBB, as opposed to the alternative free format, by almost 2 to 1 (38 versus 21 responses, respectively).

- Almost all MBO users who chose to use the MBO format in conjunction with ZBB intend to continue using MBO in the future (35 responses versus only 1 response from a manager that intends to drop it).

- Over three quarters of the previous MBO users who chose to use the alternative free format in conjunction with ZBB, intend to continue using MBO in the future (17 versus 4 responses, respectively).

- Previous non-users of MBO preferred using the free format with ZBB by a ratio of 4 to 1 against MBO users (43 versus 9 responses, respectively).

- Four fifths of the previous non-users of MBO who chose to use the MBO format in conjunction with ZBB, intend to continue using MBO in the future (8 versus 2 responses, respectively).

- Twenty nine, out of the previous fourty three non-users of MBO, who opted for the free format with ZBB, intend to continue as non-users in the future.

In general terms, there is a clear pattern toward intending to use MBO in the future from respondents who either used MBO before ZBB or used it in conjunction with ZBB. Only respondents who were previous non-users of MBO and opted for the free format in conjunction with ZBB show a tendency toward not using MBO in the future. In other words, it appears that exposure to MBO, either on its own or in conjunction with ZBB, influenced respondents positively about using MBO, as a large proportion of them expressed intention of using it again.

The independent variables can be directly extracted from the questionnaire of decision unit managers, with each of the first three questions representing an independent variable, or, can be created by combining information from these three questions. Labels are used in both the SPSS printouts and the text of the thesis, in order to facilitate the manipulation of these variables. The 'variable labels', and the corresponding information carried by each variable can be described as follows:

MBOPRIOR	Identify whether the respondent was a previous MBO user or not. Response options were Yes = 6 or No = 7.
FORMAT	Identify whether the respondent used MBO or the Free format option with ZBB. Response options were MBO = 6 or Free = 7.
MBOFUTUR	Identify whether the respondent intends to use MBO in the future. Response options were Yes = 6 or No = 7.
YSFORMAT	Identify whether the respondent, who was a previous MBO user, used the MBO format or the Free format with ZBB. Response options were MBO = 6 or Free = 7.
NOFORMAT	Identify whether the respondent, who was a previous non-user of MBO, used the MBO format or the Free format with ZBB. Response options were MBO = 6 or Free = 7.
YSMBOFTR	Identify whether the respondent, who was a previous MBO user and used the MBO format with ZBB, intends to use MBO in the future. Response options were Yes = 6 or No = 7.
YSFREFTR	Identify whether the respondent, who was a previous MBO user but used the Free format with ZBB, intends to use MBO in the future. Response options were Yes = 6 or No = 7.
NOMBOFTR	Identify whether the respondent, who was a previous non-user of MBO but used the MBO format with ZBB, intends to use MBO in the future. Response options were Yes = 6 or No = 7.
NOFREFTR	Identifying whether the respondent, who was a previous non-user of MBO and used the Free format with ZBB, intends to use MBO in the future. Response options were Yes = 6 or No = 7.

Figure 4.3 show that the population of respondents can be broken down for the stand-alone independent variables MBOPRIOR, FORMAT and MBOFUTUR, as well as for the combination of these variables, as they can branch-out from MBOPRIOR. These somewhat difficult labels are necessary to manipulate the data with SPSS; a bit of creative analysis will show that the information content is summarized in these few characters.

CRITERION VARIABLES

In addition the first three questions, the remaining questions of the survey of decision unit managers contain information on the respondent's perceptions about ZBB (questions 4 to 33) and, information on the effort required to implement the process (questions 34 to 37). These questions are called the 'criterion variables'. Some of these questions contain useful information for testing the thesis hypotheses. Questions 4, 5, 6 and 7 were selected to test the first hypothesis, as they contain specific information about the contribution of ZBB in setting roles and objectives. Questions 19, 24 and 25 were selected to test the second hypothesis, given their specificity about the contribution of ZBB as a budgetary process (i.e. 'packaging' the budget, 'ranking' the budget and ending up with an effective budget). Questions 34, 35, 36 and 37 were selected to test the third hypothesis given their

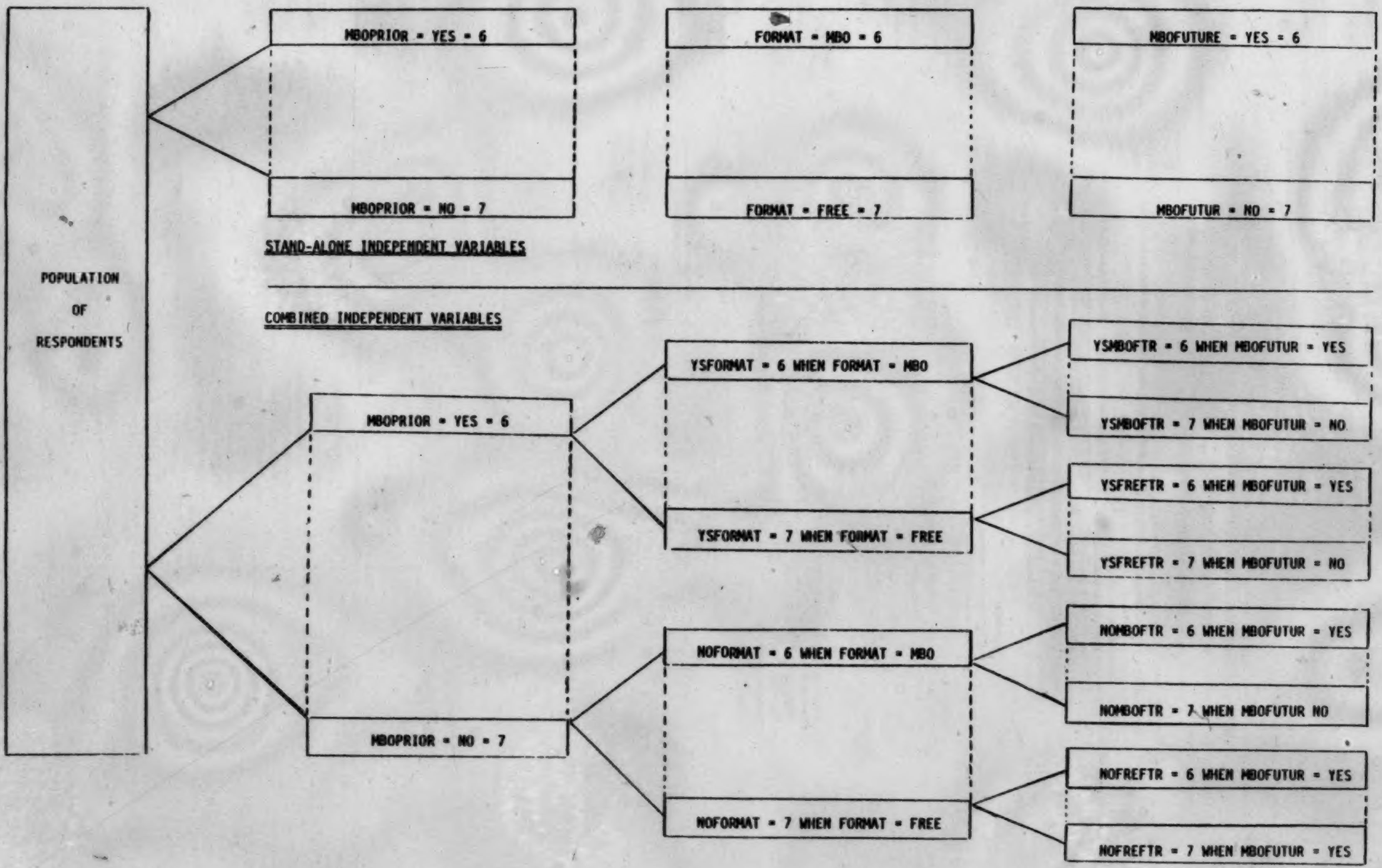

POPULATION OF RESPONDENTS
MBOPRIOR = YES = 6
MBOPRIOR = NO = 7
FORMAT = MBO = 6
FORMAT = FREE = 7
MBOFUTURE = YES = 6
MBOFUTUR = NO = 7
STAND-ALONE INDEPENDENT VARIABLES
COMBINED INDEPENDENT VARIABLES
MBOPRIOR = YES = 6
MBOPRIOR = NO = 7
YSFORMAT = 6 WHEN FORMAT = MBO
YSFORMAT = 7 WHEN FORMAT = FREE
NOFORMAT = 6 WHEN FORMAT = MBO
NOFORMAT = 7 WHEN FORMAT = FREE
YSMBOFTR = 6 WHEN MBOFUTUR = YES
YSMBOFTR = 7 WHEN MBOFUTUR = NO
YSFREFTR = 6 WHEN MBOFUTUR = YES
YSFREFTR = 7 WHEN MBOFUTUR = NO
NOMBOFTR = 6 WHEN MBOFUTUR = YES
NOMBOFTR = 7 WHEN MBOFUTUR NO
NOFREFTR = 6 WHEN MBOFUTUR = YES
NOFREFTR = 7 WHEN MBOFUTUR = YES

FIGURE 4.3 INDEPENDENT VARIABLES

specificity about the effort required to implement ZBB. The remaining questions were discarded because they contain mostly unrelated information, or they were either to narrow or to wide in scope in relation to the specific issues addressed by the hypotheses. The additional 'noise' or 'lack of scope' of these questions would have viased the results of the three hypotheses at hand.

In order to facilitate the manipulation of these variables, 'variable labels' are also used. Figure 4.4 identifies the criterion variables labels used, a short description of the information content carried by the variables, the hypothesis for which the variables are useful and the question number providing the data.

STATISTICAL PROCEDURE

The statistical tests of hypotheses investigates the central tendency of the variables, examining the means and variances of the various criterion variables among the various sub-groups determined by the independent variables. The procedure tests the significance of the differences between the means that result when each criterion variable (e.g. RESP) is broken down into the two groups established by each independent variable (e.g. MBOPRIOR). Specifically the procedure will test the null hypothesis

CRITERION VARIABLE LABEL	HYPOTHESIS USED	INFORMATION CONTENT	SURVEY QUESTION N°
RESP	1	ZBB contribution re: clarifying responsibility of unit	4
UNDERSTD	1	ZBB contribution re: understanding end-results expected	5
COMAGREE	1	ZBB contribution re: superior-subordinate communication & agreement on responsibilities and end-results expected	6
RORESULT	1	ZBB contribution re: value of roles and objectives results	7
DPRESULT	2	ZBB contribution re: value of decision packages results	19
RKRESULT	2	ZBB contribution re: value of ranking results	24
EFCTVBGT	2	ZBB rating as budgeting tool re previous method	25
HRSFIRST	3	Hours spent first time using ZBB	34
LEARNHRS	3	Hours spent learning ZBB	35
DOCUMHRS	3	Hours spent filling forms	36
HRSNEXT	3	Estimate of hours required next ZBB	37

FIGURE 4.4 CRITERION VARIABLES

H_0: $\mu 1 = \mu 2$

against the research hypotheses

H_1: $\mu 1 > \text{or} < \mu 2$

where, $\mu 1$ and $\mu 2$ represent the subpopulation means of the two groups of each criterion variable, when broken down by an independent variable.

The intention is to infer, from a comparison of means, some pattern of behaviour that may be reasonably attributed to the interaction of MBO and ZBB. Since it is highly probable that two groups from the same population would be different due to the natural variability in the population, it is clear that a difference in group means does not necessarily imply that the populations from which they are drawn actually differ on the characteristics being studied. The objective of the statistical procedure used is to determine whether or not a difference between two group means is significantly indicative of a true difference between the two populations they represent. This is done by reference to the probability associated with H_0, testing at a selected 'level of significance'. This thesis will test H_0 at a level of significance $\alpha = .05$ (probability of a Type I error = 5%); that is, with only 5% probability of rejecting H_0 when it is true.

The test statistic "t" (also known as student's "t") is used in calculating the probability associated with H_0. This statistic is particularly useful for the analysis of small samples (usually with 1 to 30 degrees of freedom) and is almost identical to the "z" statistic, which is traditionally used for larger samples, with degrees of freedom larger than 30. The test statistic "t" assumes that the random variables are normally distributed with mean μ and unknown population variance σ^2, which is estimated by the sample variance s^2. Given two populations with mean μ_1 and μ_2 respectively and common variance σ^2, all unknown, the SPSS program for "t" computes s_1^2 and s_2^2 and computes a 'pooled variance estimate' s^2, which is the weighted average of the sub-groups variance and the best estimator for σ^2. The SPSS program computes "t" and the probability associated with the occurrence of a value equal to or larger than $|t|$, sign ignored. Given that the thesis hypotheses are all one-tailed (i.e. attempting to show that the mean of one group is larger or smaller than the mean of another, as opposed to simply different from each other, with sign ignored), the two-tailed probability provided by the output has to be divided by two, to convert it to the appropriate one-tailed value.

To reject H_0 the following computed results are needed:

For $H_0: \mu_1 = \mu_2$
and $H_1: \mu_1 > \mu_2$

"t" must be positive and the one-tailed probability must be smaller than the level of significance established. Alternatively, H_0

cannot be rejected.

For $H_0: \mu_1 = \mu_2$

and $H_1: \mu_1 < \mu_2$

"t" must be negative and the one-tailed probability must be smaller than the level of significance established. Alternatively, H_0 cannot be rejected.

For populations with unequal variances "t" cannot be computed for the differences in sample means. However, an approximation to "t" may be computed. Given that sometimes it is not known whether the two populations have the same variance, SPSS provides an "F" test of sample variance. The procedure basically tests the null hypothesis

$H_0: \sigma_1^2 = \sigma_2^2$

against the alternative hypothesis

$H_1: \sigma_1^2 \neq \sigma_2^2$

The SPSS program computes an "F" statistic equal to the larger s^2 divided by the smaller s^2. If the probability of "F" is greater than a level of significance α' selected H_0 is accepted and "t" statistic, based on the "pooled-variance estimate" for σ^2, should be used. Alternatively, if the probability of "F" is less than or equal to a level of significance α', H_0 is rejected and approximation to "t" must be used. This estimate is based on the "separate variance estimate" for σ^2. This thesis will use a level of significance $\alpha' = .05$ (probability of a Type I error = 5%), that is, with 5% probability of rejecting H_0 when it is true.

For a better understanding of the statistical procedures performed, the reader should refer to the recommended references listed in the bibliography (Nie et al, 1975; Blalock, 1972; Hays, 1963; Clave and Benson, 1979). The SPSS outputs are attached in various appendices and quoted in the text when necessary.

STATISTICAL TEST OF THE FIRST HYPOTHESIS

The first hypothesis states that "The initial phase of ZBB - setting roles and objectives - should make a less significant contribution to previous MBO users, than non-users". The argument supporting this hypothesis is that MBO users should have already in place a clear understanding of their roles and objectives, which should be easily integrated into the ZBB framework. As such readdressing the roles and objectives in conjunction with ZBB should make a less significant contribution to MBO users than that made to non-users. Further, it can also be argued that there is a higher need and, as such, a higher contribution to be made, in improving communications, understanding and agreement on roles and objectives between superiors and subordinates in groups where MBO is less used.

The hypothesis can be tested by reference to various questions which measure the respondents' perceptions about the contribution of the first phase of ZBB - setting roles and objectives. These questions are represented by the criterion variables RESP, UNDERSTD, COMAGREE, and RORESULT. These four variables measure respectively, the respondents' perceptions about the contribution of ZBB to clarifying the responsibility of the unit, understanding end results expected from the unit, obtaining agreement between superiors and subordinates on end-results expected from the unit and the overall value of results versus work involved in setting roles and objectives.

Statistically, the hypothesis can be presented as the null hypothesis

$$H_0: \mu k1 = \mu k2$$

against the research hypothesis

$$H_1: \mu k1 < \mu k2$$

with

$$\alpha = 0.05$$

where $\mu k1$: represents the mean for MBO users for criterion variable "k".

$\mu k2$: represents the mean for MBO non-users for criterion variable "k".

k : represents each of the criterion variables.

α: represents the level of significance or probability of rejecting H_0 when it is true.

Appendix C "T-Test of the First Hypothesis for the Total Sample" provides information to test this hypothesis. The most relevant test is provided by the break down of all four criterion variables by the independent variable MBOPRIOR, as the key issue in question is whether previous MBO users were able to capitalize significantly from their previous work with MBO.

The statistical information included in Appendix C is summarized in Figure 4.5 showing the breakdown of each criteria variable for MBOPRIOR.

The statistical information does not provide sufficient evidence to reject the null hypothesis H_0 in favour of H_1 in any of the four counts. MBO users had a slightly higher mean score in rating the contribution made by ZBB, with a slightly lower variability, in three of the four criterion variables (RESP, COMAGREE and RORESULT). Only in terms of improving the understanding of end results expected from the unit (UNDERSTD), the previous non-users of MBO rated slightly higher, but with also a higher variability. However, these differences are not significant enough to conclude that the sub-population means could be different for any of the four criterion variables at any reasonable level of significance, and obviously not at $\alpha = 5\%$. The research hypothesis (i.e. that ZBB would make a less significant contribution on roles and objectives to previous MBO users) is based on the underlying theory used by various writers in support of the integration of MBO an ZBB. The results, however, are not supportive of the theory. In summary, the evidence does not support the argument that previous MBO users obtained a less significant contribution from ZBB on the issue of roles and objectives. The rework of roles and objectives in conjunction with ZBB was of comparable usefulness to previous MBO users and non-users. The

		MBOPRIOR		
		MBO USERS		NON-USERS
RESP	No. of Cases	59		56
	Mean	3.271		3.214
	Standard Deviation	0.997		1.107
	"t" Value		0.29	
	Degrees of Freedom		113	
	One-tailed Probability		0.39	
UNDERSTD	No. of Cases	59		56
	Mean	3.203		3.357
	Standard Deviation	0.996		1.034
	"t" Value		-0.81	
	Degrees of Freedom		113	
	One-tailed Probability		0.21	
COMAGREE	No. of Cases	59		56
	Mean	3.441		3.411
	Standard Deviation	0.915		1.108
	"t" Value		0.16	
	Degrees of Freedom		113	
	One-tailed Probability		0.44	
RORESULT	No. of Cases	58		55
	Mean	2.931		2.927
	Standard Deviation	0.971		1.168
	"t" Value		0.02	
	"Degrees of Freedom		111	
	One-tailed Probability		0.49	

Figure 4.5 T-Test of the First Hypothesis for the Total Sample, Breaking Down for MBOPRIOR

advanced work MBO users had in place was not able to significantly influence their perceptions about the usefulness of repeating the exercise within the ZBB framework.

This initial conclusion can be further tested by reference to two more refined break downs of the same criterion variables. These break downs are provided by the independent variables YSFORMAT and NOFORMAT. These two independent variables contain information on previous usage of MBO combined with information on the format used in setting roles and objectives in conjunction with ZZB. The reason why the independent variable FORMAT is not tested alone is because the objective is to determine whether there are material differences of perceptions between previous MBO users and non-users. The usage of MBO in conjunction with ZBB, without reference to the previous status, is not material to the hypothesis at hand. Specifically, the two tests at hand are whether previous MBO users and previous non-users had similar or different perceptions about the contribution made by ZBB, based on whether the MBO or the free format was used by them in conjunction with the ZBB framework. These two tests provide the ability to identify whether the format used in conjunction with ZBB could have influenced the perceptions about the contribution of ZBB of previous MBO users and non-users, one way or another. These differences, if present, could not be recognized by the previous test and may account for at least part of the results observed.

The statistical information included in Appendix C is summarized in Figure 4.6 showing the break down of each criterion variable for YSFORMAT and NOFORMAT.

The statistical information does not provide sufficient evidence to support the argument that perceptions about the contribution made by ZBB, on roles and objectives, could have been significantly influenced, one way or another, by the format

		YSFORMAT - MBO Users -			NOFORMAT - Non - Users -		
		MBO Format		Free Format	MBO Format		Free Format
RESP	No. of Cases	38		21	11		43
	Mean	3.368		3.095	2.727		3.279
	Standard Deviation	1.051		0.889	1.191		1.054
	"t" Value		1.01			-1.51	
	Degrees of Freedom		57			52	
	One-tailed Probability		0.16			0.07	
UNDERSTD	No. of Cases	38		21	11		43
	Mean	3.158		3.286	3.091		3.395
	Standard Deviation	1.027		0.956	1.221		0.979
	"t" Value		-0.47			-0.87	
	Degrees of Freedom		57			52	
	One-tailed Probability		0.32			0.19	
COMAGREE	No. of Cases	38		21	11		43
	Mean	3.368		3.571	3.273		3.488
	Standard Deviation	1.025		0.676	1.272		1.077
	"t" Value		-0.81			-0.57	
	Degrees of Freedom		57			52	
	One-tailed Probability		0.21			0.29	
RORESULT	No. of Cases	38		20	11		42
	Mean	2.895		3.000	3.091		2.857
	Standard Deviation	1.060		0.795	1.044		1.221
	"t" Value		-0.39			0.58	
	Degrees of Freedom		56			51	
	One-tailed Probability		0.35			0.28	

Figure 4.6 T-Test of the First Hypothesis for the Total Sample, Breaking Down for YSFORMAT AND NOFORMAT.

used with ZBB by previous MBO users and non-users. It is useful to observe, however, that previous MBO users who used the free format with ZBB rated its contribution on roles and objectives slightly higher and with less variability than their counterparts who opted to remain within the MBO format, in three of the four variables

(UNDERSTD, COMAGREE and RORESULT). This is also true for previous MBO non-users who used the free format with ZBB. They also rated the contributions made by ZBB as slightly higher and with less variability than their counterparts opting to use the MBO format, in three of the four variables (RESP, UNDERSTD and COMAGREE). The differences however, are not significant enough to conclude that the sub-population means could be different at any reasonable level of significance, and obviously not at $\alpha = 5\%$.

Appendix D "T-Test of the First Hypothesis for Each Department" provides further information to test the hypothesis at hand. This appendix provides the statistical results of testing the same previous four criterion variables, breaking down for MBOPRIOR (previous MBO users and non-users), for each of the departments separately. These tests help to identify whether a marked departmental preference for or against MBO usage influenced the results one way or another.

The statistical information does not provide evidence which would support rejecting the null hypothesis H_0 in favour of H_1, for any criterion variable, for any department. Specifically, there is no material statistical evidence to support the claim that the first phase of ZBB - setting roles and objectives - made a less significant contribution to previous MBO users than to their non-user counterparts in any individual department. A department by department comparisson of previous MBO users and non-users reveals the following:

- In department 1, where there was more than a 2 to 1 ratio of MBO non-users to users (13 to 6), MBO users rated the contribution made by ZBB on roles and objectives as lower in all criterion variables with a lower variability. In this case the evidence is consistent with the research hypothesis, but not strong enough to reject the null hypothesis H_0.

- In department 2, where 8 out of 9 managers were previous users of MBO, the evidence show the opposite behavior to department 1, with previous MBO users rating the ZBB contribution higher. Although the evidence in this case strongly contradicts the research hypothesis when testing for RESP, the size of the sample of MBO non-users (1 respondent) makes this result significantly questionable.

- In department 3, where 2 managers were previous MBO users and 5 were previous non-users, the trend is again similar to department 1, with MBO users rating the ZBB contribution lower. The evidence is consistent with the research hypothesis, but not strong enough to reject H_0 on any count. The size of the sample of MBO users (2 respondents) also make this result somewhat questionable.

- In department 4, where 16 managers were previous MBO users and 10 were previous non-users, there is no clear pattern, with both groups rating higher in two of the four variables.

- In department 5, where 6 managers were previous MBO users and 4 were previous non-users, previous MBO users rated the contribution made by ZBB as higher and with less variability on all counts.

- In department 6, where the sample is evenly split into 19 previous MBO users and 19 non-users, previous non-users rated the contribution made by ZBB slightly lower, with a lower variability. The evidence, although consistent with the research hypothesis, is not strong enough to reject H_0 on any count.

The patterns described, do not provide evidence to change the statistical conclusions reached in the previous tests.

Further testing for the break down of other independent variables would not be meaningful to the hypothesis at hand. The specific interest, which has already been addressed, is for previous MBO users' and non-users' perceptions about the contributions of ZBB on roles and objectives.

STATISTICAL TEST OF THE SECOND HYPOTHESIS

The second hypothesis states that "ZBB, as a budgetary process, should be more positively received by MBO users, than non-users". The argument supporting this hypothesis is that if MBO and ZBB can be effectively integrated, ZBB should constitute a natural extension and enhancement to what MBO users are already doing, providing the needed link between objectives and fund allocations through the budgeting process. However, for those managers who have voluntarily opted not to use MBO, ZBB would be a significant change, requiring them to do some of the things they have voluntarily opted out of in order to develop a budget and, as such, not as attractive.

The hypothesis can be tested by reference to various questions which measure the ZBB users' perceptions about its contribution as a budgetary process. These questions are represented by the criterion variables DPRESULT, RKRESULT and EFCTVBGT. These three variables measure the value of preparing an incremental budget using decision packages versus the work involved in doing it, the value of ranking all of the decision packages in order of priority to facilitate the funding decision versus the work involved in doing it and, the users' rating of ZBB as a means of preparing an effective budget compared to the traditional budgeting approach used previously.

Statistically, the hypothesis can be presented as the null hypothesis

$$H_0: \mu k1 = \mu k2$$

against the research hypothesis

$$H_1: \mu k1 > \mu k2$$

with

$$\alpha = 0.05$$

where

$\mu k1$: represents the mean for MBO users for criterion variable "k",

$\mu k2$: represents the mean for MBO non-users for criterion variable "k",

k : represents each criterion variables,

α: represents the level of significance or probability of rejecting H_0 where it is true.

Appendix E "T-Test of the Second Hypothesis for the Total Sample" provides information to test this hypothesis. The most relevant test is again provided by the break down of all criterion variables by the independend variable MBOPRIOR, as a key issue is whether previous users perceived the process more positively than previous MBO non-users.

The statistical information included in Appendix E is summarized in Figure 4.7 showing the break down of each criterion variable for MBOPRIOR.

		MBOPRIOR		
		MBO USERS		NON-USERS
DPRESULT	No. of Cases	59		56
	Mean	2.695		3.286
	Standard Deviation	1.071		1.091
	"t" Value		-2.93	
	Degrees of Freedom		113	
	One-tailed Probability		0.002	
RKRESULT	No. of Cases	58		56
	Mean	2.862		3.286
	Standard Deviation	0.981		0.967
	"t" Value		-2.32	
	Degrees of Freedom		112	
	One-tailed Probability		0.011	
EFTVBGT	No. of Cases	57		53
	Mean	3.105		3.415
	Standard Deviation	1.129		1.008
	"t" Value		-1.51	
	Degrees of Freedom		108	
	One-tailed Probability		0.066	

Figure 4.7 T-Test of the Second Hypothesis for the Total Sample, Breaking Down for MBOPRIOR.

The evidence does not support the research hypothesis H_1, as currently formulated. However, the statistical results provide sufficiently strong indications that the null hypothesis H_0 can be rejected. For all three criterion variables, previous MBO users rated the contribution made by the ZBB process as lower, or in other words more negatively, than their non-user counterparts. Variability is also higher for previous MBO users in two of the three counts. Further, the probability of a value equal to or smaller than "-t" is 0.2% for DPRESULT, 1.1% for RKRESULT and 6.6%

for EFCTVBGT. At the selected level of significance of 5%, the evidence would reject H_0 for at least DPRESULT and RKRESULT, with strong indications that H_0 could also be rejected for EFCTVBGT at a slightly higher level of significance. However, there is no theory that would allow the formulation and support of the opposite to the research hypothesis, that is, that ZBB as a budgetary process should be less positively received by MBO users.

In summary, the evidence does not support the argument that previous MBO users would view the introduction of ZBB more positvely than previous non-users; on the contrary, the evidence appears to support the exact opposite statement. Therefore, the underlying theory utilized by writers supporting the integration of MBO and ZBB is questionable, and a new theory may be needed.

This initial conclusion can be further analyzed by reference to another key test provided by the break down of the same criterion variables by the independent variable FORMAT. This variable contains information about the format usage in conjunction with ZBB. Specifically, the test at hand identify whether those that used the MBO format in conjunction with ZBB had a more positive view of the process than their counterparts opting for the free format. The statistical information included in Appendix E is summarized in Figure 4.8 showing the break down of each criterion variable for FORMAT.

The statistical evidence demonstrate that the null hypothesis H_0 cannot be rejected, in favour of the research

		FORMAT		
		MBO		FREE
DPRESULT	No. of Cases	50		66
	Mean	2.840		3.046
	Standard Deviation	1.037		1.156
	"t" Value		-0.99	
	Degrees of Freedom		114	
	One-tailed Probability		0.162	
RKRESULT	No. of Cases	49		66
	Mean	3.041		3.061
	Standard Deviation	0.957		1.051
	"t" Value		-0.10	
	Degrees of Freedom		113	
	One-tailed Probability		0.459	
EFTVBGT	No. of Cases	48		64
	Mean	3.188		3.297
	Standard Deviation	1.161		1.019
	"t" Value		-0.53	
	Degrees of Freedom		110	
	One-tailed Probability		0.298	

Figure 4.8 T-Test of the Second Hypothesis for the Total Sample, Breaking Down for FORMAT.

hypothesis H_1, for the test at hand. In this test the statistics show the same trend detected in the previous test, but the evidence would not reject H_0 as in the previous test. In other words, there is evidence to believe that those respondents using the MBO format with ZBB rate ZBB lower in all three criterion variables, but the evidence is not strong enough to make the case that the theory supporting the research hypothesis may be wrong.

A further test, but not as significant, results when the three criterion variables are broken down by MBOFUTUR (intended future use of MBO). This test refers to the perceptions about ZBB from those that intend to use MBO in the future. This test makes no reference, however, to their usage of MBO prior to, or in conjunction with, ZBB. The results, available in Appendix E are consistent with the previous two patterns of responses. Actually, for at least one of the criterion variables (RKRESULT) H_0 can be rejected at $\alpha = 5\%$ but there is no current theory that would support formulating the opposite hypothesis, that is, that ZBB as a budgetary process should be less positively received by MBO users; in this case, prospective MBO users.

Appendix E includes other statistical tests that provide insight as to whether the results observed in the three previous tests could have been influenced by the interaction of MBOPRIOR, FORMAT and MBOFUTUR. Differences resulting from the interaction of variables, if present, are not recognized by the previous tests and may account for at least part of the results observed. These tests address the same three criterion variables of previous tests, breaking them down for YSFORMAT, NOFORMAT, YSMBOFTR, YSFREFTR, NOMBOFTR and NOFREFTR. The reader should refer to Figure 4.3 and the section on 'Independent Variables' at the begining of this chapter for an understanding of the information content of each of these variable. An analysis of the results of these tests reveal no significant evidences to challenge the previous findings.

Appendix F "T-Test of the Second Hypothesis for Each Department" identify the statistical results of breaking down DPRESULT, RKRESULT and EFCTVBGT for MBOPRIOR and FORMAT respectively, but separately for each department. These tests help to identify whether a marked departmental preference for or against MBO usage influenced, one way or another, the previous findings for the organization in total. The results are generally consistent with the previous findings, with the following three qualifications:

- H_0 cannot be rejected in favour of the research hypothesis H_1, with only one exception. When RKRESULT is broken down for FORMAT, for department 2, respondents opting for the MBO format with ZBB rated materially higher to those using the free format; in this case H_0 can be rejected in favour of the research hypothesis H_1.

- In department 1, H_0 can be rejected, without supporting the research hypothesis H_1, when DPRESULT and RKRESULT are broken down for MBOPRIOR, with probability for "t" equal to 4.4% in both cases. H_0 cannot be rejected when testing for EFCTVBGT. This finding is consistent with the previous findings for the total sample, but, again, there is no theory that would support the formulation of the opposite research hypothesis, that is, that ZBB as a budgetary process should be less positively received by MBO users.

- In department 6, the null hypothesis H_0 can also be rejected, without supporting the research hypothesis H_1, when DPRESULT is broken down for MBOPRIOR, with probability for "t" equal to 4.1%. H_0 cannot be rejected for RKRESULT or EFCTVBGT.

- As opposed to the two initial global tests, in a departmental basis, "t" is not consistently negative, indicating that at least in some case previous MBO users, or user of the MBO format with ZBB, as the case may be, are more positive about ZBB than their non-user counterparts.

The differences observed between these tests and the initial two tests cannot be attributed to departmental preferences for or against MBO usage, as oppposing results are present in departments with a higher concentration of MBO users and also in those with higher concentration of non-users. The marginally more conclusive results observed in the first two global tests, covering the total sample, can be attributed to the relatively similar and proportionally less fluctuating standard deviations present between the two groups in each of the global tests. These relatively similar and proportionally less fluctuating standard deviations between the two groups are due to the larger sample in the global tests. Relatively similar and less fluctuating standard deviations, in the presence of different group means, result in a computed higher value for $|t|$, sign ignored. This, in turn, results in a lower probability for $|t|$, which, if low enough, can reject H_0 and favor the appropriately formulated H_1 hypothesis. In the departmental analysis, visibly different means would not reject H_0 because of the variability associated with the observations in a smaller sample context.

STATISTICAL TEST OF THE THIRD HYPOTHESIS

The third hypothesis states that "MBO users should require less effort to learn and implement ZBB, than non-users". The argument supporting this hypothesis is that MBO users should be more familiar with planning processes and, given that they have in place a clearer understanding of their roles and objectives, they should require less effort to implement ZBB. In contrast, non-users of MBO would have to start by learning planning concepts known to MBO users, and would have to initiate the process from a cold start, identifying, expressing, agreeing and documenting their objectives.

The hypothesis can be tested by reference to various questions which measure the time required by each respondent to learn, work with and produce the budget, using ZBB. These questions are represented by the criterion variables HRSFIRST, LEARNHRS, DOCUMHRS and HRSNEXT. These four variables measure respectively, the hours spent in total in ZBB related activities during the first implementation year, the hours spent learning the process, the hours spent in documentation type activities (filling the forms as opposed to thinking through the plan and budgets), and an estimate of the hours required the next year, given the knowledge already gained.

Statistically, the hypothesis can be presented as the null hypothesis:

$$H_0: \mu_{k1} = \mu_{k2}$$

against the research hypothesis

$$H_1: \mu_{k1} < \mu_{k2}$$

with

$$\alpha = 0.05$$

where

μ_{k1}: represents the mean for MBO users for criterion variable "k"

μ_{k2}: represents the mean for MBO non-users for criterion variable "k"

k : represents each of the criterion variables

α : represents the level of significance or probability of rejecting H_0 when it is true

Appendix G "T-Test of the Third Hypothesis for the Total Sample" provides information to test this hypothesis. The most relevant test is provided, as in hypotheses one and two, by the break down of all criterion variables by the independent variable MBOPRIOR, as the key issue is whether previous MBO users were able to capitalize on their experience and available information to reduce the effort required to implement ZBB.

The statistical information in Appendix G show very high scores for the "F" test of sample variance, with probability 0.0% in all four counts. This indicates that the two populations have unequal variances and, as such, only an approximation to "t" can be used based on a separate variance estimate. The statistical results are summarized in Figure 4.9 showing the breakdown of each criterion variable for MBOPRIOR.

		MBOPRIOR		
		MBO USERS		NON-USERS
HRSFIRST	No. of cases	54		53
	Mean	83.7		50.8
	Standard Deviation	110.1		41.2
	"t" Estimate		2.05	
	Degrees of Freedom		67.78	
	One-tailed Probability		0.022	
LEARNHRS	No. of Cases	54		53
	Mean	19.6		11.5
	Standard Deviation	23.6		9.3
	"t" Estimate		2.33	
	Degrees of Freedom		69.39	
	One-tailed Probability		0.011	
DOCUMHRS	No. of Cases	54		53
	Mean	33.0		18.0
	Standard Deviation	54.1		16.6
	"t" Estimate		1.95	
	Degrees of Freedom		63.00	
	One-tailed Probability		0.028	
HRSNEXT	No. of Cases	52		53
	Mean	65.1		32.5
	Standard Deviation	114.1		32.8
	"t" Estimate		1.98	
	Degrees of Freedom		59.21	
	One-tailed Probability		0.027	

Figure 4.9 T-Test of the Third Hypothesis for the Total Sample, Breaking Down for MBOPRIOR.

The evidence cannot support the research hypothesis H_1, as currently formulated. However, the statistical results provide sufficiently clear indication that the null hypothesis H_0 can be rejected. In all four variables, previous MBO users required substantially more time with substantially more variability to learn, work with and document ZBB, than their non-users counterparts. In three of the four variables the mean scores are almost twice as large. Further, the probabilities associated with "t" (2.2% for HRSFIRST, 1.1% for LEARNHRS, 2.8% for DOCUMHRS and 2.7% for HRSNEXT) permits rejecting H_0 in all cases, at the established level of significance of $\alpha = 5\%$. However, there is no theory that would allow the formulation and support of the opposite to the research hypothesis, that is, that MBO users should require more effort to learn and implement ZBB, compared to non-users.

In summary, the evidence does not support the argument that previous MBO users would require less effort to utilize ZBB; on the contrary the evidence supports the exact opposite. Therefore, the underlying theory utilized by writers supporting the integration of MBO and ZBB may be wrong, and a new theory may be needed.

This initial conclusion can be further analyzed by reference to another key test, provided by the break down of the same criterion variables, for the independent variable FORMAT. This variable contains information on the usage of MBO or the free format with ZBB. Specifically, the test at hand analyzes whether respondents using MBO in conjunction with ZBB required less effort utilizing ZBB than their counterparts opting for the free format. Appendix G, again provide the information to test this hypothesis. Again, the very high scores for the "F" test of sample variance requires the use of an approximation to "t" based on a 'separate variance estimate'. The statistical results are summarized in Figure 4.10 showing the break down of each criterion variable for FORMAT.

		FORMAT		
		MBO		FREE
HRSFIRST	No. of Cases	47		61
	Mean	84.1		57.1
	Standard Deviation	115.6		46.5
	"t" Value		1.51	
	Degrees of Freedom		57.51	
	One-tailed Probability		0.069	
LEARNHRS	No. of Cases	47		61
	Mean	16.0		16.0
	Standard Deviation	21.5		15.8
	"t" Value		0.02	
	Degrees of Freedom		81.43	
	One-tailed Probability		0.493	
DOCUMHRS	No. of Cases	47		61
	Mean	31.4		21.5
	Standard Deviation	56.6		20.8
	"t" Value		1.15	
	Degrees of Freedom		55.64	
	One-tailed Probability		0.128	
HRSNEXT	No. of Cases	47		59
	Mean	67.9		35.3
	Standard Deviation	119.9		33.5
	"t" Estimate		1.81	
	Degrees of Freedom		51.76	
	One-tailed Probability		0.038	

Figure 4.10 T-Test of the Third Hypothesis for the Total Sample, Breaking Down for FORMAT.

The statistical evidence demonstrate that the null hypothesis H_0 can only be rejected for criterion variable HRSNEXT, and probably HRSFIRST at a slightly higher level of significance, but, in these two instances it cannot favor the research hypothesis H_1 for the test at hand. In this test, the statistics show the same general trend detected in the previous test, with MBO users generally spending more time in ZBB activities than those that opted for the free format for setting roles and objectives. The exception is LEARNHRS were both groups have similar means, although MBO users have a higher variability. In summary, those that used the MBO format the first year expect to spend more time the following year in ZBB related activities, when compared to their free-format-user counterparts.

A further test, but not as significant , results when the three criterion variables are broken down for MBOFUTUR (intended future use of MBO). This test specifically address the effort involved in ZBB related activities, breaking down the criterion variables between those that intend to use MBO in the future and those that don't. The results available in Appendix G are consistent with the previous two tests. Actually, in two cases (HRSFIRST and HRSNEXT) H_0 can be rejected but not in favor of the research hypothesis H_1. This mean that those that expect to use MBO in the future required more time the first year of ZBB and also expect to take more time in the second year. As in previous cases, there is no theory that would allow formulating a research hypothesis to this extent.

Other statistical tests included in Appendix G provide insight to whether the results observed in the previous three tests could have been influenced by the interaction of independent variables. Differences resulting from the interaction of variables, if present, are not be recognized by the previous tests and, may account in part for the results observed. These tests address the same four criterion variables of the previous tests, breaking them down for YSFORMAT, NOFORMAT, YSMBOFTR, YSFREFTR, NOMBOFTR and NOFREFTR. The reader should refer to Figure 4.3 and the section on 'Independent Variables' at the begining of this chapter, for an understanding of the information content of each variable. An analysis of the results shown in Appendix G, for the above break downs, reveal no significant evidences to challenge the previous findings.

Appendix H "T-Test of the Third Hypothesis for each Department" provide the same statistical information of two initial tests, but separately for each department. These tests identify whether a marked departmental preference for or against MBO usage may have influenced, one way or another, the previous finding for the organization in total. The results are generally consistent with the previous findings, with the following qualifications:

- The research hypothesis H_1 cannot be favoured in any count. However, H_0 can only be rejected in two cases. In department 2, when testing LEARNHRS for MBOPRIOR and, in department 3, when testing HRSNEXT for MBOPRIOR. H_0 cannot be rejected when testing for FORMAT in any department.

- As compared to the two initial global tests, in a departmental basis "t" is not consistently positive, indicating that in at least some cases previous MBO users, or user of the MBO format with ZBB, as the case may be, required less effort to utilize ZBB.

The differences observed between these tests and the initial two tests cannot be attributed to departmental preferences for or against MBO usage, as opposing results are present in departments with a higher concentration of MBO users and also in those with a higher concentration of non-users. The more conclusive results observed in the first two global tests can be attributed, as in hypothesis two, to the relatively similar and less fluctuating standard deviation present between the two groups, in each global test. These relatively similar and less fluctuating standard deviations within each of the two groups are due to the larger sample in the global tests.

V. CONCLUSIONS

The statistical analysis demonstrates that none of the three research hypotheses as originally formulated can be favored. There is no indication that the originally expected behaviors described in the thesis hypotheses were present at the reference organization during the first year of implementation of ZBB. Actually, strong indications favoring the opposite situation are sometimes present. This conclusion indicates that the underlaying theory on which the research hypotheses are based, may be wrong. The evidence strongly point toward the need for a new theory that would support different, even opposite, research hypotheses. This theory is currently not in place, to the thesis writer knowledge. However, it was not within the scope of this thesis to identify what this new theory should be. This is a challenge for future research. This does not mean that MBO and ZBB are ineffective techniques, or even that they are uncomplementary. It means, that their simultaneous use is potentially awkward and, as such, their integration is by no means automatic.

The first hypothesis attempts to identify whether MBO users had in place a definition of their roles and objectives that could be easily utilized in conjunction with ZBB. The information available is certainly not conclusive enough to categorically reject the above statement. It demonstrates, however, that MBO users obtained at least a similar contribution or benefit, for reworking their roles and objectives during the implementation of ZBB, than that obtained by their non-user counterparts working at them, theoretically for the first time. The lack of a direct and automatic integration of the outputs of MBO and the requirements of ZBB is probably explained by the different focus of both processes. MBO emphasizes the personal objectives of each individual in the organization, while ZBB is more concerned with departmental and organizational objectives and budgets. These 'group' objectives are not equal to the summation of individual objectives, nor to those of the group's manager. In addition, objectives in MBO may have a different time dimension than those required for ZBB. MBO is concerned with the results that must be achieved, without a specific constrait on the planning horizon; ZBB on the other hand, is specifically concerned with the results that must be achieved in the budgeting horizon (i.e. usually one fiscal year). As such, managers cannot directly utilize their own personal objectives in addressing departmental plans and budgets with ZBB. The rework required, and its related contribution, is provided by the new group perspective that ZBB provides, which is not available in MBO. This is different from saying that MBO is not doing a good job at setting roles and objectives.

The second hypothesis attempts to identify whether, ZBB, as a budgetary process, would be more positively received by MBO users. Bhada and Minmier (1980) claim that ZBB should be the logical technique to harmonize strategies, objectives and goals with the final budget. The information available refers to line managers' perceptions about the contribution made by ZBB on the above issues. The evidence would reject the above statement, at least as far as the line managers are concerned. As stated previously, this is not equivalent to saying that ZBB and MBO are incompatible, or that individually they are not good techniques. What it means is that the benefits resulting from the 'integration' of both processes, which some writers and practitioners have claimed exist, are not there; at least not in this case. These results may be due to many different causes. Certainly the difference in focus of both processes, explained above, inhibits a direct link between MBO type objectives and a ZBB type budgets. However, this does not account for the sometimes strong differences on perceptions about the contribution made by ZBB as a budgetary process. A reasonable explanation of these differences may be that in an environment where individual roles and objectives are clearly defined, traditional approaches to budgeting, which are generally less effort demanding, may well satisfy the needs, from the individual manager standpoint. ZBB requires more effort from individual managers, to produce an output which is subsequently used by senior management to make global decisions on fund allocations. The improved understanding and decision making capability of ZBB is present at the senior management level. From a first line manager's point of view, ZBB may not be contributing significantly to the understanding of the group's plan and budget, beyond what it's already has in place with MBO and traditional budgeting techniques.

The third hypothesis attempts to identify whether MBO users required less effort to learn and implement ZBB. This was expected given their previous exposure to MBO, which is an objectives-based planning process with some similarities to ZBB. The evidence here is somewhat difficult to understand, specifically because of the order of magnitude of the differences, in some cases. Previous MBO users required significantly more effort (in terms of hours) to learn, work with and produce results with ZBB. Further- more, they also expect to take more time in the second year of ZBB usage. Generally this is also true for those that opted to use MBO, as opposed to the free formats, in conjunction with ZBB, and for those that expect to use MBO in the future. A somewhat simplistic explanation, but nevertheless feasible, may be that those that voluntarily opted for using MBO could have preferred structured approaches to planning to the point where they actually enjoyed spending more time at these issues. This however, is not consistent with the findings of the second hypothesis, or those in the area of effort required to learn ZBB. A probably more realistic explanation is that simply MBO and ZBB are different processes, with different focuses, to address different needs. Attempting to 'integrate' both process is not simply a problem of commitment, desire or hard work, but rather, a problem of getting a square peg to fit in a round hole. Previous MBO users, and those using MBO in conjunction with ZBB, may have spent significant effort trying to reconcile the differences between the two processes.

An underlying conclusion, when all the above issues are considered, could well be that both MBO and ZBB, as well as other planning and budgeting processes, have a contribution to make in most environments. The starting point in deciding to utilize them should be to clearly understand what can be expected of them and what role they should play. Perceived benefits of integrating various processes may generate more problems than benefits.

This thesis has attempted to identify some, but certainly not all, the pitfalls that may exist in integrating MBO and ZBB. The conclusions are not a judgement of the potential contribution that MBO and ZBB can make to an organization. Rather, they simply demonstrate that trying to integrate both processes is not necessarily bound to succeed. The thesis show some of the pitfalls. Many factors may have influenced the results one way or another. Issues such as, the problems that some of the departments and/or the organization may have faced at the time ZBB was implemented and their impact on plans and budgets, the characteristics of the MBO and ZBB processes used, the quality of the output produced, to mention a few, could have influenced the results, one way or another. The contribution of this thesis is only on a small dimension of all the potential sources of problems. Hopefully however, this contribution will useful to other researchers examining related issues.

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APPENDIX A

ZERO-BASE BUDGETING POST IMPLEMENTATION REVIEW

(QUESTIONNAIRE)

APPENDIX A

ZERO BASE BUDGETING POST IMPLEMENTATION REVIEW

SURVEY OF DECISION UNIT MANAGERS

1. This questionnaire should be completed by all decision unit managers involved throughout the Z.B.B. process. Its completion should not be delegated to others marginally involved.

2. Please return the answered questionnaire to (name, position, address and date required has been deleted).

3. All of the questions are multiple choice. Please record your answers by circling one of the numbers. If you do not find the exact answer that fits your needs, use the one that is closest to it.

For example:

ROLES AND OBJECTIVES

How do you feel the process (setting roles and objectives) contributed in each of the following areas:

	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
- Clarifying the responsibility of the unit	1	2	3	[✓ 4]	5

ANSWER

4. Please feel free to add comments on any issues that you consider important. Use the back of the questionnaire, if necessary.

5. Please do not include your name in the questionnaire. The intention of the survey is to provide information on how the organization, and not specific individuals, viewed the Z.B.B. process.

6. To help your department evaluate the process and plan for the future, the written comments and suggested improvements received will be typed and passed back to the department management.

APPENDIX A

ZERO BASE BUDGETING POST IMPLEMENTATION REVIEW SURVEY OF DECISION UNIT MANAGERS

Please identify the department and division for which you prepared decision packages, by circling the appropriate number.

Department 1

Division 1.1
Division 1.2
Division 1.3
Division 1.4

Department 2

Division 2.1
Division 2.2
Division 2.3

Department 3

Division 3.1
Division 3.2
Division 3.3

Department 4

Division 4.1
Division 4.2
Division 4.3.

Department 5

Division 5.1
Division 5.2
Division 5.3
Division 5.4

Department 6

Division 6.1
Division 6.2
Division 6.3
Division 6.4
Division 6.5
Division 6.6
Division 6.7

Notes: (Not included in the original questionnaire)

- The departments and division names have been substituted by number to preserve the anonymity of the organization.
- In the tabulation of responses a "0" (zero) is used when no response has been provided.
- An (*) is used to denote where company terminology used in the original questionnaire has been replaced by conventional terms of same meaning.

APPENDIX A

ZERO BASE BUDGETING POST IMPLEMENTATION REVIEW
SURVEY OF DECISION UNIT MANAGERS

			To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
	ROLES AND OBJECTIVES						
	For the next three questions please circle either the numbers '6' or '7' to indicate your answer.						
1.	- Did you use the MBO* process prior to the Implementation of Z.B.B.?	Yes: 6 / No: 7	//	//	//	//	//
2.	- Did you use the MBO* format or the Free format for the preparation of your roles and objectives?	MBO: 6 / Free: 7	//	//	//	//	//
3.	- Do you intend to use the MBO* process in the future?	Yes: 6 / No: 7	//	//	//	//	//
	How do you feel the process (setting roles and objectives) contributed in each of the following areas:						
4.	- Clarifying the responsibility of the unit?		1	2	3	4	5
5.	- Providing better understanding of end results expected from the unit?		1	2	3	4	5
6.	- As a vehicle for communicating and agreeing on responsibilities and expected end results with superiors and subordinates?		1	2	3	4	5
7.	Were the results obtained valuable in relation to the amount of "work" effort required?		1	2	3	4	5
	CROSS IMPACT ANALYSIS						
8.	- How involved were you in the cross impact analysis process?		1	2	3	4	5
	How do you feel the cross impact analysis process contributed in each of the following areas:						
	- Facilitating agreement on support required between interfacing groups:						
9.	- Within your department		1	2	3	4	5
10.	- With other departments		1	2	3	4	5

ZERO BASE BUDGETING POST IMPLEMENTATION REVIEW SURVEY OF DECISION UNIT MANAGERS

	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
CROSS IMPACT ANALYSIS (continued)					
11. - Developing cost awareness among users of service?..	1	2	3	4	5
12. - Identifying redundant, duplicated or unnecessary services?................................	1	2	3	4	5
13. Were the results obtained valuable in relation to the amount of "work" effort required?	1	2	3	4	5
DECISION PACKAGES					
How do you feel the process (developing decision packages) contributed in each of the following areas:					
14. - Developing understanding of activities required to achieve the proposed objectives?..................	1	2	3	4	5
15. - Developing understanding of costs and benefits of performing incremental work?......................	1	2	3	4	5
16. - Developing understanding of relative priority of incremental work?.................................	1	2	3	4	5
17. - Appropriate allocation of personnel?................	1	2	3	4	5
18. - As a communication vehicle for each decision unit manager to recommend a course of action?..........	1	2	3	4	5
19. Were the results obtained valuable in relation to the amount of "work" effort required?..................	1	2	3	4	5
RANKING					
How do you feel the process (ranking decision packages) contributed in each of the following areas:					
20. - Producing a prioritized list of expenditure opportunities available to the department?........	1	2	3	4	5
21. - Ensuring that the most beneficial packages are recognized as such by senior management?..........	1	2	3	4	5

APPENDIX A

ZERO BASE BUDGETING POST IMPLEMENTATION REVIEW
SURVEY OF DECISION UNIT MANAGERS

RANKING (continued)

	To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent
22. - As a vehicle for understanding peer activities and obtaining their input?	1	2	3	4	5
23. - As an effective way of understanding the implications of alternative levels of funding by reference to what can and cannot be done at each level of funding?	1	2	3	4	5
24. Were the results obtained valuable in relation to the amount of "work effort" required?	1	2	3	4	5

GENERAL

How do you rate the Z.B.B. process in each of the following areas:

	Poor	Fair	Adequate	Good	Excellent
25. - As a means of preparing an effective budget* for your department, compared to the method used last year?	1	2	3	4	5
26. - As a vehicle for improving communications between first line managers and upper and middle management?	1	2	3	4	5
27. - As a vehicle for identifying and proposing improved ways of achieving your objectives?	1	2	3	4	5
How do you rate the performance of our consultants, (name deleted), in each of the following areas:					
28. - Quality of Z.B.B. manual?	1	2	3	4	5
29. - Quality of training material and session?	1	2	3	4	5
30. - Availability of consultants when required?	1	2	3	4	5
31. - General adequateness of advice received?	1	2	3	4	5
32. - Consultants' experience and know-how in relation to demands of the project?	1	2	3	4	5
33. - Ability of consultants to relate to your individual needs?	1	2	3	4	5

APPENDIX A

ZERO BASE BUDGETING POST IMPLEMENTATION REVIEW SURVEY OF DECISION UNIT MANAGERS

GENERAL (continued)

34. How many hours did you spend in planning and budgeting the expense and operating portion of the budget, using Z.B.B.? .... _____ Hours

35. What percentage of this time was spent learning the process, as opposed to working with it? .... _____ %

36. What percentage of the working time was spent in documentation activities (filling out the forms), as opposed to conceiving your plans and budget? .... _____ %

37. Given the knowledge and information now available, how many hours do you estimate it would take the next time? .... _____ Hours

APPENDIX B

TABULATION OF RESPONSES

TABULATION OF RESPONSES APPENDIX B

VARIABLES AND RELATED QUESTIONS RELEVANT TO THE THESIS

VARIABLE NAME	QUESTION NO.
MBOPRIOR	1
FORMAT	2
MBOFUTUR	3
RESP	4
UNDERSTD	5
COMAGREE	6
RORESULT	7
DPRESULT	19
RKRESULT	24
EFCTVBGT	25
HRSFIRST	34
LEARNHRS*	35
DOCUMHRS*	36
HRSNEXT	37

* Responses related to LEARNHRS (Question No. 35) and DOCUMHRS (Question No. 36) are expressed as a percentage of HRSFIRST (Question No. 34). The SPSS program converts these percentages to hours in order to work with comparable units of measurement.

APPENDIX B

TABULATION OF RESPONSES

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 0 (Unidentified)

O B S	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
1	7	6	6	4	4	4	3	3	3	3	120	10	5	80
2	6	6	6	4	3	4	3	3	3	3	210	5	43	200
3	6	7	6	1	2	4	3	1	2	2	15	50	75	10
4	0	0	0	3	4	4	2	2	4	1	60	60	30	40
5	7	7	6	1	1	1	1	1	2	2	90	30	30	30
6	7	7	7	3	3	3	1	3	3	4	50	14	70	15
7	7	7	7	2	2	2	1	4	4	3	40	35	60	32

- -

APPENDIX B

TABULATION OF RESPONSES

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 1

OBS	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 1.1														
8	6	6	0	4	3	4	3	3	1	3	28	50	25	14
9	7	6	6	1	2	4	3	3	3	3	70	15	5	35
10	6	6	6	3	2	2	2	2	3	1	150	30	10	100
11	7	7	7	5	5	5	5	5	4	4	30	40	80	15
Division 1.2														
12	7	6	6	3	3	4	4	2	4	1	40	25	50	15
13	6	6	6	3	4	4	3	3	3	4	8	50	10	10
14	6	6	6	3	3	3	2	1	3	4	35	20	5	20
15	7	6	6	4	5	5	4	4	4	4	6	10	20	50
16	7	7	7	2	1	1	1	1	1	1	54	15	70	20
17	7	7	7	4	3	4	2	3	3	4	60	25	25	30
18	7	7	7	5	4	4	4	4	4	4	60	18	10	40
Division 1.3														
19	6	6	6	3	3	4	2	2	2	2	25	20	40	30
20	7	7	7	2	2	4	4	5	4	4	40	10	30	40
21	6	6	6	4	3	3	4	2	3	2	35	10	50	20
22	7	7	7	5	4	4	2	2	2	3	20	35	30	5
Division 1.4														
23	7	7	7	4	4	4	3	4	4	4	40	50	25	15
24	7	7	7	3	4	5	4	5	5	4	20	10	20	20
25	7	7	7	3	2	3	2	1	3	2	20	25	25	15
26	7	7	7	3	4	5	3	4	3	3	48	20	50	30

APPENDIX B

TABULATION OF RESPONSES

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 2

O B S	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 2.1														
27	6	7	7	3	1	3	1	1	2	2	0	0	0	0
28	6	6	6	3	4	3	3	3	4	3	40	20	40	30
29	7	7	7	1	2	3	2	3	3	4	36	80	80	24
30	6	6	6	4	4	4	4	4	4	4	100	50	20	60
Division 2.2														
31	6	7	6	4	4	4	3	3	3	4	80	40	50	50
32	6	6	6	4	4	4	3	5	3	4	80	35	60	60
33	6	7	6	3	3	3	3	4	3	0	80	50	70	60
34	6	6	6	3	3	4	4	4	4	4	40	35	25	40
Division 2.3														
35	6	6	6	3	4	4	3	3	4	4	290	25	20	150

APPENDIX B

TABULATION OF RESPONSES

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 3

OBS	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 3.0														
36	7	6	6	4	4	4	3	4	4	4	50	25	75	30
Division 3.1														
37	7	7	6	3	4	4	3	5	3	4	85	5	25	50
38	7	7	7	1	3	3	1	4	4	4	96	35	30	60
Division 3.2														
39	7	7	6	4	4	4	5	4	4	4	40	20	10	30
40	7	7	7	3	4	4	4	4	4	4	80	25	10	70
Division 3.3														
41	6	6	0	2	2	2	1	1	3	3	60	10	80	60
42	6	6	6	5	5	4	5	4	4	5	14	50	50	6

APPENDIX B

TABULATION OF RESPONSES

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 4

O B S	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 4.0														
43	0	0	0	3	3	2	2	4	2	3	280	50	40	150
Division 4.1														
44	6	6	6	3	4	4	4	2	2	2	111	8	70	100
45	6	6	6	3	3	3	1	1	1	1	35	30	90	12
46	7	7	6	4	4	4	2	2	3	3	50	10	10	30
47	6	7	6	4	4	3	4	3	3	3	48	0	30	32
48	7	7	6	3	4	3	2	3	3	2	30	30	30	30
49	6	6	6	3	3	3	3	4	4	4	0	0	0	0
Division 4.2														
50	7	7	6	3	4	3	2	2	2	3	0	0	0	0
51	6	6	6	3	4	4	3	3	3	3	10	10	30	10
52	6	7	6	3	3	4	3	3	3	3	25	50	25	12
53	6	7	6	3	4	4	4	4	4	4	35	5	25	25
54	7	7	7	4	4	4	4	5	5	4	35	10	10	20
55	6	7	6	3	4	4	2	2	3	3	18	60	50	16
56	6	6	6	2	2	3	3	3	4	4	40	10	5	40
57	6	6	6	3	1	1	2	3	3	2	22	40	25	12
58	6	6	6	4	3	4	4	4	4	4	10	25	75	6
59	7	6	7	3	4	3	3	3	3	3	40	50	25	20
60	7	6	6	3	3	3	3	4	4	3	40	70	50	16
61	7	7	7	3	3	3	2	3	4	4	45	15	70	30
62	0	0	0	3	3	3	3	3	3	4	32	30	30	20
63	6	6	7	5	5	5	3	1	1	0	450	0	75	150

APPENDIX B

TABULATION OF RESPONSES

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 4
(Continued)

O B S	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 4.3														
64	7	7	6	2	3	1	3	2	1	2	45	15	50	35
65	6	6	6	3	3	3	2	3	0	4	600	5	60	750
Division 4.4														
66	7	7	0	4	4	4	4	3	3	2	48	0	40	48
67	6	7	7	3	3	4	3	3	4	3	50	20	40	40
68	0	7	0	3	3	3	3	3	2	2	40	0	25	40
69	6	7	6	1	5	4	4	1	1	2	20	5	25	20
70	7	7	7	4	4	4	4	4	4	4	15	10	25	10
71	6	6	6	4	3	3	4	3	3	4	210	5	50	185

TABULATION OF RESPONSES APPENDIX B

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 5

O B S	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 5.1														
72	6	6	6	1	1	3	1	1	2	1	500	25	25	350
Division 5.2														
73	7	7	0	3	3	2	1	2	1	2	210	10	30	200
74	6	7	6	4	4	4	3	2	2	2	100	25	50	0
Division 5.3														
75	7	7	7	4	4	3	3	3	3	4	75	20	50	50
76	6	7	7	3	2	3	2	2	3	4	150	20	10	100
77	6	7	6	4	4	4	3	2	2	3	130	25	10	70
78	7	6	0	3	2	1	2	3	3	3	18	5	65	15
Division 5.4														
79	6	7	6	4	4	3	3	1	1	2	120	20	50	70
80	0	7	0	3	2	3	2	3	5	4	150	25	10	135
81	7	6	7	1	1	1	1	1	4	2	140	5	40	140
82	6	7	6	3	3	4	2	3	2	2	100	50	80	75

APPENDIX B

TABULATION OF RESPONSES

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 6

O B S	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 6.1														
83	7	7	7	4	4	4	4	4	4	4	12	50	10	6
84	7	7	6	5	5	5	5	5	5	5	12	60	10	6
85	7	0	0	4	3	2	3	4	4	0	20	25	50	30
86	7	7	6	4	4	4	4	4	4	5	150	5	30	50
87	7	7	7	3	3	4	3	4	4	4	60	10	35	24
Division 6.2														
88	7	7	7	4	4	4	3	3	4	0	10	25	75	5
89	7	7	7	4	4	4	4	3	2	4	10	25	75	8
90	7	6	6	3	2	4	5	4	4	0	80	20	25	45
91	0	6	6	1	1	5	3	2	2	5	90	30	50	60
92	6	7	7	4	4	4	4	4	4	4	50	60	25	20
93	7	7	7	3	3	4	2	4	3	5	150	30	50	50
Division 6.3														
94	7	7	7	3	4	2	3	4	3	4	30	90	50	10
95	6	7	6	3	2	2	3	2	2	1	120	50	50	40
96	7	7	7	3	3	4	3	2	2	2	25	20	20	25
97	7	7	7	5	5	5	0	3	3	4	30	25	50	25
98	6	6	6	5	4	4	2	2	1	1	105	10	20	50
99	6	6	6	4	3	3	2	3	3	3	75	25	50	50
100	7	7	6	4	4	4	4	3	4	4	15	20	75	2
101	6	6	6	4	4	3	3	3	3	5	30	80	20	10
102	7	7	6	3	3	4	3	4	3	5	45	30	30	30

TABULATION OF RESPONSES

APPENDIX B

SURVEY OF DECISION UNIT MANAGERS

DEPARTMENT CODE = 6
(Continued)

O B S	XXXXXXXXXXXXXXXXXXXX QUESTIONS RELEVANT TO THESIS XXXXXXXXXXXXXXXXXXXXXXX													
	1	2	3	4	5	6	7	19	24	25	34	35	36	37
Division 6.4														
103	6	6	6	4	3	2	3	4	4	5	35	15	80	10
104	6	6	6	4	3	3	3	4	4	3	30	20	20	12
105	6	6	6	4	3	5	4	3	3	5	80	10	5	60
106	6	6	6	2	4	5	4	3	3	4	15	10	40	15
107	6	6	6	1	1	1	1	1	1	2	77	40	50	70
Division 6.5														
108	6	7	6	3	4	4	4	4	4	4	24	35	40	15
109	6	7	6	2	3	2	3	1	2	2	2	40	50	0
110	7	7	7	3	3	4	4	4	4	3	10	50	10	8
111	6	7	6	3	3	4	0	3	4	4	10	30	10	8
Division 6.6														
112	6	6	6	5	4	4	4	3	3	2	50	12	20	75
113	6	6	6	4	3	4	3	3	3	4	40	10	10	35
114	6	6	6	1	1	1	1	2	2	2	24	25	60	15
115	6	6	6	4	4	4	4	4	4	4	0	0	0	0
Division 6.7														
116	6	7	6	4	3	4	3	3	3	4	160	50	50	80
117	7	7	7	2	2	2	1	2	2	4	50	50	75	30
118	7	6	6	1	4	3	3	2	2	3	28	40	5	14
119	7	7	6	3	2	2	2	3	2	2	20	50	20	10
120	7	0	0	5	5	3	4	4	4	5	0	0	0	0
121	6	6	6	4	4	4	4	4	4	4	15	10	25	5

APPENDIX C

T-TEST OF THE FIRST HYPOTHESIS FOR THE TOTAL SAMPLE

```
SPSS BATCH SYSTEM                                                          03/28/83        PAGE    1 Appendix C

SPSS FOR MULTICS/6880, VERSION H, RELEASE 8.0,  JULY 15, 1979
UNIVERSITY OF CALGARY, VERSION H, RELEASE 8.0B, OCTOBER 29, 1980
DEFAULT SPACE ALLOCATION..      ALLOWS FOR..   655 TRANSFORMATIONS
WORKSPACE     458748 BYTES                    2621 RECODE VALUES + LAG VARIABLES
TRANSPACE      65532 BYTES                   10486 IF/COMPUTE OPERATIONS

                  1 FILE NAME       MBA THESIS STATISTICAL SURVEY ANALYSIS
                  2 VARIABLE LIST   MBOPRIOR,FORMAT,MBOFUTUR,RESP,UNDERSTD,COMAGREE,RORESULT
                  3 INPUT MEDIUM    DISK
                  4 SUBFILE LIST    UNID (7) DPT1 (19) DPT2 (9) DPT3 (7) DPT4 (29) DPT5 (11)
                  5                 DPT6 (39)
                  6 INPUT FORMAT    FIXED (3X,7(1X,F1.0),30X)

                  ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

                  VARIADLE  FORMAT  RECORD    COLUMNS

                  MBOPRIOR  F 1. 0       1     5-   5
                  FORMAT    F 1. 0       1     7-   7
                  MBOFUTUR  F 1. 0       1     9-   9
                  RESP      F 1. 0       1    11-  11
                  UNDERSTD  F 1. 0       1    13-  13
                  COMAGREE  F 1. 0       1    15-  15
                  RORESULT  F 1. 0       1    17-  17

THE INPUT FORMAT PROVIDES FOR    7 VARIABLES.    7 WILL BE READ
IT PROVIDES FOR  1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF    47 'COLUMNS' ARE USED ON A RECORD.

                  7 MISSING VALUES MBOPRIOR TO RORESULT(0)/
                  8 VALUE LABELS   MBOPRIOR (6)MBO USER (7)NON USER (0)MISSING/
                  9                FORMAT (6)MBO USED (7)FREE USED (0)MISSING/
                 10                MBOFUTUR (6)FUTURE USER (7)FUTURE NON USER (0)MISSING/
                 11                RESP TO RORESULT (1)POOR (2)FAIR (3)ADEQUATE (4)GOOD
                 12                (5)EXCELLENT (0)MISSING/
                 13 VAR LABELS     MBOPRIOR PREVIOUS MBO USER/
                 14                FORMAT FORMAT USED FOR R&O WITH ZBB/
                 15                MBOFUTUR INTENDED FUTURE USE OF ZBB/
                 16                RESP CLARIFYING RESP OF THE UNIT/
                 17                UNDERSTD UNDERSTANDING END RESLT EXP FROM UNIT/
                 18                COMAGREE SUP-SUB COMM & AGREE'NG ON END RESULT/
                 19                RORESULT VALUE OF R&O RESULT VS WORK/
                 20 TASK NAME      TEST OF MEANS FOR HYPOTHESIS ONE
                 21 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 6) YSFORMAT=6
                 22 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 7) YSFORMAT=7
                 23 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 6) NOFORMAT=6
                 24 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 7) NOFORMAT=7
                 25 VAR LABELS     YSFORMAT FORMAT USED WITH ZBB BY MBO USER/
                 26                NOFORMAT FORMAT USED WITH ZBB BY NON USER/
                 27 RUN SUBFILES   ALL
                 28 T-TEST         GROUPS=MBOPRIOR(6,7)/VARIABLES=RESP TO RORESULT

***** T-TEST PROBLEM REQUIRES     208 BYTES OF WORKSPACE *****
```

```
SPSS BATCH SYSTEM                                                                                    03/28/83        PAGE    2  Appendix C
TEST OF MEANS FOR HYPOTHESIS ONE                                                                                                MBOPRIOR
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                                * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                      *                                    *
VARIABLE            NUMBER                STANDARD       STANDARD    *     F    2-TAIL  *    T    DEGREES OF  2-TAIL  *    T    DEGREES OF   2-TAIL
                   OF CASES      MEAN     DEVIATION        ERROR     *   VALUE   PROB.  *  VALUE   FREEDOM    PROB.  *  VALUE   FREEDOM     PROB.
---------------------------------------------------------------------------------------------------------------------------------------------------
RESP       CLARIFYING RESP OF THE UNIT                                *                 *                            *
     GROUP 1          59        3.2712        0.997          0.130   *                 *                            *
                                                                      *   1.23  0.432   *   0.29     113      0.772  *   0.29    110.29      0.773
     GROUP 2          56        3.2143        1.107          0.148   *                 *                            *
                                                                      *                 *                            *
---------------------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT                       *                 *                            *
     GROUP 1          59        3.2034        0.996          0.130   *                 *                            *
                                                                      *   1.08  0.776   *  -0.81     113      0.419  *  -0.81    112.09      0.419
     GROUP 2          56        3.3571        1.034          0.138   *                 *                            *
                                                                      *                 *                            *
---------------------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUB COMM & AGREE'NG ON END RESULT                       *                 *                            *
     GROUP 1          59        3.4407        0.915          0.119   *                 *                            *
                                                                      *   1.47  0.151   *   0.16     113      0.874  *   0.16    106.79      0.875
     GROUP 2          56        3.4107        1.108          0.148   *                 *                            *
                                                                      *                 *                            *
---------------------------------------------------------------------------------------------------------------------------------------------------
RORESULT  VALUE OF R&O RESULT VS WORK                                 *                 *                            *
     GROUP 1          58        2.9310        0.971          0.127   *                 *                            *
                                                                      *   1.45  0.170   *   0.02     111      0.985  *   0.02    105.16      0.985
     GROUP 2          55        2.9273        1.168          0.158   *                 *                            *
                                                                      *                 *                            *
---------------------------------------------------------------------------------------------------------------------------------------------------
```

Appendix C

YSFORMAT

```
SPSS BATCH SYSTEM                                                                    03/28/83         PAGE    3
TEST OF MEANS FOR HYPOTHESIS ONE

TRANSPACE REQUIRED..      400 BYTES
     4 TRANSFORMATIONS
     0 RECODE VALUES + LAG VARIABLES
    36 IF/COMPUTE OPERATIONS

CPU TIME REQUIRED..    3.94 SECONDS


             29 T-TEST           GROUPS=YSFORMAT(6,7)/VARIABLES=RESP TO RORESULT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                    03/28/83         PAGE    4
TEST OF MEANS FOR HYPOTHESIS ONE
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID        DPT1         DPT2         DPT3         DPT4         DPT5         DPT6

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - YSFORMAT EQ          6.
GROUP 2 - YSFORMAT EQ          7.
                                                                         * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                 *                                *                           *
VARIABLE            NUMBER              STANDARD     STANDARD    *    F    2-TAIL  *    T    DEGREES OF  2-TAIL *    T    DEGREES OF   2-TAIL
                   OF CASES     MEAN   DEVIATION       ERROR     *  VALUE  PROB.   *  VALUE   FREEDOM    PROB.  *  VALUE    FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------------
RESP       CLARIFYING RESP OF THE UNIT                           *                 *                            *
      GROUP 1       38        3.3684      1.051        0.170     *                 *                            *
                                                                 *  1.40  0.430    *   1.01      57      0.318  *   1.06     47.49       0.296
      GROUP 2       21        3.0952      0.889        0.194     *                 *                            *
                                                                 *                 *                            *
------------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT                  *                 *                            *
      GROUP 1       38        3.1579      1.027        0.167     *                 *                            *
                                                                 *  1.15  0.748    *  -0.47      57      0.641  *  -0.48     43.98       0.635
      GROUP 2       21        3.2857      0.956        0.209     *                 *                            *
                                                                 *                 *                            *
------------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUP COMM & AGREE'NG ON END RESULT
      GROUP 1       38        3.3684      1.025        0.166     *                 *                            *
                                                                 *  2.30  0.051    *  -0.81      57      0.419  *  -0.91     55.05       0.365
      GROUP 2       21        3.5714      0.676        0.148     *                 *                            *
                                                                 *                 *                            *
------------------------------------------------------------------------------------------------------------------------------------------
RORESULT  VALUE OF R&O RESULT VS WORK                            *                 *                            *
      GROUP 1       38        2.8947      1.060        0.172     *                 *                            *
                                                                 *  1.78  0.181    *  -0.39      56      0.698  *  -0.43     49.13       0.672
      GROUP 2       20        3.0000      0.795        0.178     *                 *                            *
                                                                 *                 *                            *
------------------------------------------------------------------------------------------------------------------------------------------
```

<u>Appendix C</u>

<u>NOFORMAT</u>

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS ONE                                                              03/28/83        PAGE    5

CPU TIME REQUIRED..    0.50 SECONDS


             30 T-TEST          GROUPS=NOFORMAT(6,7)/VARIABLES=RESP TO RORESULT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS ONE                                                              03/28/83        PAGE    6
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID        DPT1        DPT2        DPT3        DPT4        DPT5        DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - NOFORMAT EQ        6.
GROUP 2 - NOFORMAT EQ        7.
                                                                        * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE          NUMBER                 STANDARD     STANDARD  *     F    2-TAIL *     T   DEGREES OF  2-TAIL *     T   DEGREES OF   2-TAIL
                 OF CASES      MEAN     DEVIATION      ERROR    *   VALUE  PROB.  *   VALUE   FREEDOM    PROB. *   VALUE   FREEDOM     PROB.
-------------------------------------------------------------------------------------------------------------------------------------------
RESP     CLARIFYING RESP OF THE UNIT                            *                 *                            *
     GROUP 1       11        2.7273       1.191        0.359    *                 *                            *
                                                                *   1.28  0.549   *   -1.51      52      0.137  *   -1.40    14.27       0.183
     GROUP 2       43        3.2791       1.054        0.161    *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT                 *                 *                            *
     GROUP 1       11        3.0909       1.221        0.368    *                 *                            *
                                                                *   1.55  0.309   *   -0.87      52      0.386  *   -0.77    13.47       0.457
     GROUP 2       43        3.3953       0.979        0.149    *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUB COMM & AGREE'NG ON END RESULT                 *                 *                            *
     GROUP 1       11        3.2727       1.272        0.384    *                 *                            *
                                                                *   1.39  0.433   *   -0.57      52      0.570  *   -0.52    13.89       0.613
     GROUP 2       43        3.4884       1.077        0.164    *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------
RORESULT  VALUE OF R&O RESULT VS WORK                           *                 *                            *
     GROUP 1       11        3.0909       1.044        0.315    *                 *                            *
                                                                *   1.37  0.619   *    0.58      51      0.564  *    0.64    17.88       0.532
     GROUP 2       42        2.8571       1.221        0.188    *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                              03/28/83        PAGE    7  Appendix C
TEST OF MEANS FOR HYPOTHESIS ONE



               31 READ INPUT DATA
CPU TIME REQUIRED..     0.52 SECONDS

               32 FINISH

       NORMAL END OF JOB.
          32 CONTROL CARDS WERE PROCESSED.
           0 ERRORS WERE DETECTED.
```

APPENDIX D

T-TEST OF THE FIRST HYPOTHESIS FOR EACH DEPARTMENT

Appendix D

```
SPSS BATCH SYSTEM                                                                    03/28/83         PAGE     1

SPSS FOR MULTICS/6880, VERSION H, RELEASE 8.0,  JULY 15, 1979
UNIVERSITY OF CALGARY, VERSION H, RELEASE 8.0B, OCTOBER 29, 1980
DEFAULT SPACE ALLOCATION..       ALLOWS FOR..    655 TRANSFORMATIONS
WORKSPACE      458748 BYTES                     2621 RECODE VALUES + LAG VARIABLES
TRANSPACE       65532 BYTES                    10486 IF/COMPUTE OPERATIONS

                  1 FILE NAME       MBA THESIS STATISTICAL SURVEY ANALYSIS
                  2 VARIABLE LIST   MBOPRIOR,FORMAT,MBOFUTUR,RESP,UNDERSTD,COMAGREE,RORESULT
                  3 INPUT MEDIUM    DISK
                  4 SUBFILE LIST    UNID (7) DPT1 (19) DPT2 (9) DPT3 (7) DPT4 (29) DPT5 (11)
                  5                 DPT6 (39)
                  6 INPUT FORMAT    FIXED (3X,7(1X,F1.0),30X)

                   ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

                   VARIABLE  FORMAT  RECORD    COLUMNS

                   MBOPRIOR  F 1. 0       1      5-   5
                   FORMAT    F 1. 0       1      7-   7
                   MBOFUTUR  F 1. 0       1      9-   9
                   RESP      F 1. 0       1     11-  11
                   UNDERSTD  F 1. 0       1     13-  13
                   COMAGREE  F 1. 0       1     15-  15
                   RORESULT  F 1. 0       1     17-  17

THE INPUT FORMAT PROVIDES FOR    7 VARIABLES.    7 WILL BE READ
IT PROVIDES FOR  1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF    47 'COLUMNS' ARE USED ON A RECORD.

                  7 MISSING VALUES MBOPRIOR TO RORESULT(0)/
                  8 VALUE LABELS   MBOPRIOR (6)MBO USER (7)NON USER (0)MISSING/
                  9                FORMAT (6)MBO USED (7)FREE USED (0)MISSING/
                 10                MBOFUTUR (6)FUTURE USER (7)FUTURE NON USER (0)MISSING/
                 11                RESP TO RORESULT (1)POOR (2)FAIR (3)ADEQUATE (4)GOOD
                 12                (5)EXCELLENT (0)MISSING/
                 13 VAR LABELS     MJOPRIOR PREVIOUS MBO USER/
                 14                FORMAT FORMAT USED FOR R&O WITH ZBB/
                 15                MBOFJTUR INTENDED FUTURE USE OF ZBB/
                 16                RESP CLARIFYING RESP OF THE UNIT/
                 17                UNDERSTD UNDERSTANDING END RESLT EXP FROM UNIT/
                 18                COMAGREE SUP-SUB COMM & AGREE'NG ON END RESULT/
                 19                RORESULT VALUE OF R&O RESULT VS WORK/
                 20 TASK NAME      TEST OF MEANS FOR HYPOTHESIS ONE
                 21 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 6) YSFORMAT=6
                 22 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 7) YSFORMAT=7
                 23 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 6) NOFORMAT=6
                 24 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 7) NOFORMAT=7
                 25 VAR LABELS     YSFORMAT FORMAT USED WITH ZBB BY MBO USER/
                 26                NOFORMAT FORMAT USED WITH ZBB BY NON USER/
                 27 RUN SUBFILES   (DPT1)(DPT2)(DPT3)(DPT4)(DPT5)(DPT6)
                 28 T-TEST         GROUPS=MBOPRIOR(6,7)/VARIABLES=RESP TO RORESULT

***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****

                 29 READ INPUT DATA
```

```
SPSS BATCH SYSTEM                                                                                   03/28/83          PAGE    2  Appendix D
TEST OF MEANS FOR HYPOTHESIS ONE
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                           Department 1
SUBFILE    DPT1
                                                                                                                             MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.

                                                                              *                     * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE         NUMBER                 STANDARD      STANDARD  *                     *
               OF CASES       MEAN     DEVIATION       ERROR    *    F      2-TAIL   *    T     DEGREES OF  2-TAIL *    T     DEGREES OF   2-TAIL
                                                                *  VALUE    PROB.    *  VALUE     FREEDOM    PROB.  *  VALUE     FREEDOM     PROB.
--------------------------------------------------------------------------------------------------------------------------------------------------
RESP        CLARIFYING RESP OF THE UNIT
    GROUP 1        6        3.3333       0.516        0.211     *                     *                             *
                                                                *   5.96    0.061     *  -0.09       17      0.926  *  -0.13       16.94      0.902
    GROUP 2       13        3.3846       1.261        0.350     *                     *                             *
--------------------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD    UNDERSTANDING END RESLT EXP FROM UNIT
    GROUP 1        6        3.0000       0.632        0.258     *                     *                             *
                                                                *   3.91    0.143     *  -0.56       17      0.580  *  -0.71       16.69      0.486
    GROUP 2       13        3.3077       1.251        0.347     *                     *                             *
--------------------------------------------------------------------------------------------------------------------------------------------------
COMAGREE    SUP-SUB COMM & AGREE'NG ON END RESULT
    GROUP 1        6        3.3333       0.816        0.333     *                     *                             *
                                                                *   1.75    0.558     *  -1.34       17      0.199  *  -1.49       12.85      0.161
    GROUP 2       13        4.0000       1.080        0.300     *                     *                             *
--------------------------------------------------------------------------------------------------------------------------------------------------
RORESULT    VALUE OF R&O RESULT VS WORK
    GROUP 1        6        2.6667       0.816        0.333     *                     *                             *
                                                                *   1.96    0.472     *  -0.93       17      0.364  *  -1.06       13.53      0.308
    GROUP 2       13        3.1538       1.144        0.317     *                     *                             *
--------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                                    03/28/83        PAGE    3  Appendix D
TEST OF MEANS FOR HYPOTHESIS ONE
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                         Department 2
SUBFILE    DPT2                                                                                                               MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                      * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                          *           *                          *
VARIABLE        NUMBER              STANDARD   STANDARD   *   F   2-TAIL *   T   DEGREES OF 2-TAIL *   T   DEGREES OF   2-TAIL
               OF CASES    MEAN    DEVIATION    ERROR     * VALUE  PROB. * VALUE  FREEDOM   PROB.  * VALUE  FREEDOM      PROB.
------------------------------------------------------------------------------------------------------------------------------------
RESP     CLARIFYING RESP OF THE UNIT                      *             *                          *
     GROUP 1       8       3.3750      0.518      0.183   *             *                          *
                                                          * 0.00  1.000 *  4.33      7     0.003   * 12.98     7.00        0.000
     GROUP 2       1       1.0000      0.000      0.000   *             *                          *
                                                          *             *                          *
------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT           *             *                          *
     GROUP 1       8       3.3750      1.061      0.375   *             *                          *
                                                          * 0.00  1.000 *  1.22      7     0.261   *  3.67     7.00        0.008
     GROUP 2       1       2.0000      0.000      0.000   *             *                          *
                                                          *             *                          *
------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUB COMM & AGREE'NG ON END RESULT           *             *                          *
     GROUP 1       8       3.6250      0.518      0.183   *             *                          *
                                                          * 0.00  1.000 *  1.14      7     0.292   *  3.42     7.00        0.011
     GROUP 2       1       3.0000      0.000      0.000   *             *                          *
                                                          *             *                          *
------------------------------------------------------------------------------------------------------------------------------------
RDRESULT  VALUE OF R&D RESULT VS WORK                     *             *                          *
     GROUP 1       8       3.0000      0.926      0.327   *             *                          *
                                                          * 0.00  1.000 *  1.02      7     0.342   *  3.06     7.00        0.018
     GROUP 2       1       2.0000      0.000      0.000   *             *                          *
                                                          *             *                          *
------------------------------------------------------------------------------------------------------------------------------------
```

Appendix D

Department 3

MBOPRIOR

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS ONE                                                       03/28/83        PAGE    4
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT3

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.

                                                                    * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE        NUMBER                STANDARD    STANDARD  *                    *                            *
               OF CASES     MEAN     DEVIATION     ERROR    *   F      2-TAIL    *    T    DEGREES OF 2-TAIL  *    T    DEGREES OF  2-TAIL
                                                            * VALUE     PROB.    *  VALUE    FREEDOM   PROB.  *  VALUE    FREEDOM    PROB.
----------------------------------------------------------------------------------------------------------------------------------------
RESP      CLARIFYING RESP OF THE UNIT
    GROUP 1        2       3.5000      2.121       1.500    *                    *                            *
                                                            *                    *                            *
    GROUP 2        5       3.0000      1.225       0.548    *  3.00     0.317    *   0.41      5      0.697   *   0.31      1.28      0.807
                                                            *                    *                            *
----------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT
    GROUP 1        2       3.5000      2.121       1.500    *                    *                            *
                                                            *                    *                            *
    GROUP 2        5       3.8000      0.447       0.200    * 22.50     0.018    *  -0.35      5      0.742   *  -0.20      1.04      0.875
                                                            *                    *                            *
----------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUB COMM & AGREE'NG ON END RESULT
    GROUP 1        2       3.0000      1.414       1.000    *                    *                            *
                                                            *                    *                            *
    GROUP 2        5       3.8000      0.447       0.200    * 10.00     0.068    *  -1.28      5      0.257   *  -0.78      1.08      0.577
                                                            *                    *                            *
----------------------------------------------------------------------------------------------------------------------------------------
RORESULT  VALUE OF RBO RESULT VS WORK
    GROUP 1        2       3.0000      2.828       2.000    *                    *                            *
                                                            *                    *                            *
    GROUP 2        5       3.2000      1.483       0.663    *  3.64     0.258    *  -0.13      5      0.901   *  -0.09      1.23      0.940
                                                            *                    *                            *
----------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS ONE
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS           03/28/83        PAGE    5  Appendix D
SUBFILE   DPT4                                                                                                        Department 4
- - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - MBOPRIOR - - - - - - -

GROUP 1 - MBOPRIOR EQ        6.
GROUP 2 - MBOPRIOR EQ        7.

                                                                * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE        NUMBER                STANDARD    STANDARD  *                      *                                  *
               OF CASES      MEAN    DEVIATION     ERROR    *  F     2-TAIL  *   T    DEGREES OF  2-TAIL  *   T    DEGREES OF   2-TAIL
                                                            * VALUE   PROB.  * VALUE    FREEDOM    PROB.  * VALUE    FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------------
RESP     CLARIFYING RESP OF THE UNIT
    GROUP 1       16       3.1250      0.885      0.221     *                *                            *
                                                            *  1.72   0.415  * -0.53      24      0.598   * -0.57     22.88      0.575
    GROUP 2       10       3.3000      0.675      0.213     *                *                            *
------------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT
    GROUP 1       16       3.3750      1.025      0.256     *                *                            *
                                                            *  4.50   0.028  * -0.93      24      0.359   * -1.09     22.77      0.287
    GROUP 2       10       3.7000      0.483      0.153     *                *                            *
------------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUB COMM & AGREE'NG ON END RESULT
    GROUP 1       16       3.5000      0.894      0.224     *                *                            *
                                                            *  1.06   0.889  *  0.82      24      0.418   *  0.82     18.85      0.423
    GROUP 2       10       3.2000      0.919      0.291     *                *                            *
------------------------------------------------------------------------------------------------------------------------------------------
RORESULT  VALUE OF REO RESULT VS WORK
    GROUP 1       16       3.0625      0.929      0.232     *                *                            *
                                                            *  1.12   0.887  *  0.44      24      0.661   *  0.45     20.13      0.658
    GROUP 2       10       2.9000      0.876      0.277     *                *                            *
------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS ONE                                                       03/28/83        PAGE    6  Appendix D
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT5                                                                                                   Department 5
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - MBOPRIOR - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                                       * POOLED VARIANCE ESTIMATE  * SEPARATE VARIANCE ESTIMATE
VARIABLE           NUMBER                 STANDARD      STANDARD   *                   *                           *
                  OF CASES     MEAN      DEVIATION        ERROR    *   F     2-TAIL    *    T    DEGREES OF 2-TAIL  *    T     DEGREES OF   2-TAIL
                                                                   * VALUE   PROB.     *  VALUE   FREEDOM   PROB.  *  VALUE    FREEDOM     PROB.
---------------------------------------------------------------------------------------------------------------------------------------------------
RESP       CLARIFYING RESP OF THE UNIT                             *                   *                           *
      GROUP 1       6        3.1667        1.169         0.477     *                   *                           *
                                                                   *  1.16   0.824     *   0.54      8      0.606  *   0.53      6.21       0.617
      GROUP 2       4        2.7500        1.258         0.629     *                   *                           *
---------------------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT                    *                   *                           *
      GROUP 1       6        3.0000        1.265         0.516     *                   *                           *
                                                                   *  1.04   0.900     *   0.61      8      0.560  *   0.60      6.48       0.567
      GROUP 2       4        2.5000        1.291         0.645     *                   *                           *
---------------------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUB COMM & AGREE'NG ON END RESULT                    *                   *                           *
      GROUP 1       6        3.5000        0.548         0.224     *                   *                           *
                                                                   *  3.06   0.260     *   3.72      8      0.006  *   3.31      4.33       0.030
      GROUP 2       4        1.7500        0.957         0.479     *                   *                           *
---------------------------------------------------------------------------------------------------------------------------------------------------
RORESULT  VALUE OF RBO RESULT VS WORK                              *                   *                           *
      GROUP 1       6        2.3333        0.816         0.333     *                   *                           *
                                                                   *  1.37   0.703     *   1.04      8      0.330  *   1.00      5.80       0.356
      GROUP 2       4        1.7500        0.957         0.479     *                   *                           *
---------------------------------------------------------------------------------------------------------------------------------------------------

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS ONE                                                      03/28/83       PAGE    7   Appendix D
FILE    MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT6                                                                                                  Department 6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - MBOPRIOR - - - - -
GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.

                                                                         * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE           NUMBER              STANDARD     STANDARD  *                 *
                  OF CASES    MEAN    DEVIATION      ERROR    *  F    2-TAIL *   T    DEGREES OF  2-TAIL *   T    DEGREES OF   2-TAIL
                                                              * VALUE  PROB.  * VALUE   FREEDOM    PROB. * VALUE   FREEDOM      PROB.
-------------------------------------------------------------------------------------------------------------------------------------
RESP       CLARIFYING RESP OF THE UNIT
     GROUP 1        19       3.4211      1.170        0.268   *               *                          *
                                                              * 1.31  0.568   * -0.15     36      0.883  * -0.15    35.35       0.883
     GROUP 2        19       3.4737      1.020        0.234   *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
UNDERSTD  UNDERSTANDING END RESLT EXP FROM UNIT
     GROUP 1        19       3.1579      0.958        0.220   *               *                          *
                                                              * 1.01  0.979   * -1.18     36      0.245  * -1.18    36.00       0.245
     GROUP 2        19       3.5263      0.964        0.221   *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
COMAGREE  SUP-SUB COMM & AGREE'NG ON END RESULT
     GROUP 1        19       3.3158      1.204        0.276   *               *                          *
                                                              * 1.57  0.348   * -0.74     36      0.461  * -0.74    34.31       0.462
     GROUP 2        19       3.5789      0.961        0.221   *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
RORESULT  VALUE OF REO RESULT VS WORK
     GROUP 1        18       3.0556      0.998        0.235   *               *                          *
                                                              * 1.06  0.902   * -0.82     34      0.417  * -0.82    33.97       0.417
     GROUP 2        18       3.3333      1.029        0.243   *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                      03/28/83        PAGE    8 Appendix D
TEST OF MEANS FOR HYPOTHESIS ONE

TRANSPACE REQUIRED..       400 BYTES
      4 TRANSFORMATIONS
      0 RECODE VALUES + LAG VARIABLES
     36 IF/COMPUTE OPERATIONS

CPU TIME REQUIRED..    4.54 SECONDS


                30 FINISH

          NORMAL END OF JOB.
             30 CONTROL CARDS WERE PROCESSED.
              0 ERRORS WERE DETECTED.
```

APPENDIX E

T-TEST OF THE SECOND HYPOTHESIS FOR THE TOTAL SAMPLE

```
SPSS BATCH SYSTEM                                                                          03/28/83          PAGE    1

SPSS FOR MULTICS/6880, VERSION H, RELEASE 8.0, JULY 15, 1979
UNIVERSITY OF CALGARY, VERSION H, RELEASE 8.0B, OCTOBER 29, 1980
DEFAULT SPACE ALLOCATION..       ALLOWS FOR..    655 TRANSFORMATIONS
WORKSPACE      458748 BYTES                     2621 RECODE VALUES + LAG VARIABLES
TRANSPACE       65532 BYTES                    10486 IF/COMPUTE OPERATIONS

                 1 FILE NAME       MBA THESIS STATISTICAL SURVEY ANALYSIS
                 2 VARIABLE LIST   MBOPRIOR,FORMAT,MBOFUTUR,DPRESULT,RKRESULT,EFCTVBGT
                 3 INPUT MEDIUM    DISK
                 4 SUBFILE LIST    UNID (7) DPT1 (19) DPT2 (9) DPT3 (7) DPT4 (29) DPT5 (11)
                 5                 DPT6 (39)
                 6 INPUT FORMAT    FIXED (3X,3(1X,F1.0),10X,3(1X,F1.0),22X)

                  ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

                  VARIABLE  FORMAT  RECORD    COLUMNS

                  MBOPRIOR  F 1. 0       1      5-    5
                  FORMAT    F 1. 0       1      7-    7
                  MBOFUTUR  F 1. 0       1      9-    9
                  DPRESULT  F 1. 0       1     21-   21
                  RKRESULT  F 1. 0       1     23-   23
                  EFCTVBGT  F 1. 0       1     25-   25

THE INPUT FORMAT PROVIDES FOR   6 VARIABLES.    6 WILL BE READ
IT PROVIDES FOR  1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF    47 'COLUMNS' ARE USED ON A RECORD.

                 7 MISSING VALUES MBOPRIOR TO EFCTVBGT(0)/
                 8 VALUE LABELS   MBOPRIOR (6)MBO USER (7)NON USER (0)MISSING/
                 9                FORMAT (6)MBO USED (7)FREE USED (0)MISSING/
                10                MBOFUTUR (6)FUTURE USER (7)FUTURE NON USER (0)MISSING/
                11                DPRESULT TO EFCTVBGT (1)POOR (2)FAIR (3)ADEQUATE (4)GOOD
                12                (5)EXCELLENT (0)MISSING/
                13 VAR LABELS     MBOPRIOR PREVIOUS MBO USER/
                14                FORMAT FORMAT USED FOR R&O WITH ZBB/
                15                MBOFUTUR INTENDED FUTURE USE OF ZBB/
                16                DPRESULT VALUE OF DEC PACK RESULT VS WORK/
                17                RKRESULT VALUE OF RANKING RESULT VS WORK/
                18                EFCTVBGT ZBB MEAN FOR EFFECTIVE BUDGET/
                19 TASK NAME      TEST OF MEANS FOR HYPOTHESIS TWO
                20 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 6) YSFORMAT=6
                21 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 7) YSFORMAT=7
                22 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 6) NOFORMAT=6
                23 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 7) NOFORMAT=7
                24 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 6 AND MBOFUTUR EQ 6) YSMBOFTR=6
                25 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 6 AND MBOFUTUR EQ 7) YSMBOFTR=7
                26 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 7 AND MBOFUTUR EQ 6) YSFREFTR=6
                27 IF             (MBOPRIOR EQ 6 AND FORMAT EQ 7 AND MBOFUTUR EQ 7) YSFREFTR=7
                28 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 6 AND MBOFUTUR EQ 6) NOMBOFTR=6
                29 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 6 AND MBOFUTUR EQ 7) NOMBOFTR=7
                30 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 7 AND MBOFUTUR EQ 6) NOFREFTR=6
                31 IF             (MBOPRIOR EQ 7 AND FORMAT EQ 7 AND MBOFUTUR EQ 7) NOFREFTR=7
                32 VAR LABELS     YSFORMAT FORMAT USED WITH ZBB BY MBO USER/
                33                NOFORMAT FORMAT USED WITH ZBB BY NON USER/
                34                YSMBOFTR INTED MBO FTR USE BY USER PRIOR & ZBB/
                35                YSFREFTR INTED MBO FTR USE BY USER PRIOR &FREE/
                36                NOMBOFTR INTED MBO FTR USE BY NONUSER &WTH ZBB/
                37                NOFREFTR INTED MBO FTR USE BY NONUSER &FREEUSE/
                38 RUN SUBFILES   ALL
                39 T-TEST         GROUPS=MBOPRIOR(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****
```

```
SPSS BATCH SYSTEM                                                                                  03/28/83        PAGE    2  Appendix E
TEST OF MEANS FOR HYPOTHESIS TWO
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS                                       MBOPRIOR
SUBFILE   UNID         DPT1         DPT2         DPT3         DPT4        DPT5        DPT6

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                                * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                   *                                        *
VARIABLE           NUMBER             STANDARD      STANDARD       *    F    2-TAIL  *    T   DEGREES OF 2-TAIL *    T    DEGREES OF   2-TAIL
                  OF CASES    MEAN   DEVIATION        ERROR        *  VALUE  PROB.   *  VALUE   FREEDOM   PROB. *  VALUE    FREEDOM     PROB.
--------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                         *                 *                          *
     GROUP 1        59       2.6949      1.071        0.139        *                 *                          *
                                                                   *  1.04   0.889   *  -2.93    113     0.004  *  -2.93   112.43      0.004
     GROUP 2        56       3.2857      1.091        0.146        *                 *                          *
                                                                   *                 *                          *
--------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                          *                 *                          *
     GROUP 1        58       2.8621      0.981        0.129        *                 *                          *
                                                                   *  1.03   0.914   *  -2.32    112     0.022  *  -2.32   111.95      0.022
     GROUP 2        56       3.2857      0.967        0.129        *                 *                          *
                                                                   *                 *                          *
--------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                             *                 *                          *
     GROUP 1        57       3.1053      1.129        0.150        *                 *                          *
                                                                   *  1.25   0.412   *  -1.51    108     0.133  *  -1.52   107.83      0.131
     GROUP 2        53       3.4151      1.008        0.139        *                 *                          *
                                                                   *                 *                          *
--------------------------------------------------------------------------------------------------------------------------------------------
```

Appendix E

FORMAT

```
SPSS BATCH SYSTEM                                                                          03/28/83        PAGE    3
TEST OF MEANS FOR HYPOTHESIS TWO

TRANSPACE REQUIRED..      1200 BYTES
     12 TRANSFORMATIONS
      0 RECODE VALUES + LAG VARIABLES
    140 IF/COMPUTE OPERATIONS

CPU TIME REQUIRED..     5.81 SECONDS


               40 T-TEST          GROUPS=FORMAT(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                          03/28/83        PAGE    4
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    M3A      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ          6.
GROUP 2 - FORMAT    EQ          7.
                                                                            * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                  *                 *                               *
VARIABLE            NUMBER                  STANDARD     STANDARD  *     F    2-TAIL *     T   DEGREES OF  2-TAIL *     T    DEGREES OF   2-TAIL
                   OF CASES       MEAN     DEVIATION       ERROR   *  VALUE   PROB.  *  VALUE   FREEDOM    PROB.  *  VALUE    FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                         *                 *                            *
       GROUP 1       50        2.8400       1.037         0.147    *                 *                            *
                                                                   *   1.24  0.430   *  -0.99     114      0.324  *  -1.01    110.71      0.317
       GROUP 2       66        3.0455       1.156         0.142    *                 *                            *
                                                                   *                 *                            *
------------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                          *                 *                            *
       GROUP 1       49        3.0408       0.957         0.137    *                 *                            *
                                                                   *   1.21  0.498   *  -0.10     113      0.918  *  -0.11    108.32      0.916
       GROUP 2       66        3.0606       1.051         0.129    *                 *                            *
                                                                   *                 *                            *
------------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                             *                 *                            *
       GROUP 1       48        3.1875       1.161         0.168    *                 *                            *
                                                                   *   1.30  0.331   *  -0.53     110      0.597  *  -0.52     93.66      0.604
       GROUP 2       64        3.2969       1.019         0.127    *                 *                            *
                                                                   *                 *                            *
------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                                    03/28/83         PAGE    5 Appendix E
TEST OF MEANS FOR HYPOTHESIS TWO                                                                                                MBOFUTUR
CPU TIME REQUIRED..    0.52 SECONDS

            41 T-TEST          GROUPS=MBOFUTUR(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

***** T-TEST PROBLEM REQUIRES    160 BYTES OF WORKSPACE *****

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                                    03/28/83         PAGE    6
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOFUTUR EQ          6.
GROUP 2 - MBOFUTUR EQ          7.
                                                                            * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE          NUMBER                STANDARD     STANDARD  *              *                           *
               OF CASES      MEAN      DEVIATION      ERROR    *   F    2-TAIL *   T    DEGREES OF 2-TAIL *   T    DEGREES OF   2-TAIL
                                                               * VALUE  PROB.  * VALUE    FREEDOM   PROB. * VALUE    FREEDOM     PROB.
-------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                     *               *                          *
     GROUP 1       73        2.8767        1.066        0.125  *               *                          *
                                                               *  1.30  0.350  *  -1.40    107     0.165  *  -1.34    62.29      0.186
     GROUP 2       36        3.1944        1.215        0.202  *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                      *               *                          *
     GROUP 1       72        2.9722        0.964        0.114  *               *                          *
                                                               *  1.03  0.881  *  -1.68    106     0.095  *  -1.68    69.05      0.098
     GROUP 2       36        3.3056        0.980        0.163  *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                        *               *                          *
     GROUP 1       71        3.1690        1.171        0.139  *               *                          *
                                                               *  1.85  0.054  *  -1.60    103     0.113  *  -1.78    85.65      0.079
     GROUP 2       34        3.5294        0.861        0.148  *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                               03/28/83        PAGE    7  Appendix E
CPU TIME REQUIRED..     0.48 SECONDS                                                                                       YSFORMAT


              42 T-TEST          GROUPS=YSFORMAT(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

  ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                               03/28/83        PAGE    8
FILE    MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - YSFORMAT EQ           6.
GROUP 2 - YSFORMAT EQ           7.
                                                                          * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE            NUMBER                STANDARD     STANDARD   *                *                            *
                   OF CASES      MEAN    DEVIATION      ERROR     *   F     2-TAIL *   T    DEGREES OF  2-TAIL *    T     DEGREES OF    2-TAIL
                                                                  * VALUE   PROB.  * VALUE   FREEDOM    PROB.  *  VALUE    FREEDOM      PROB.
------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT   VALUE OF DEC PACK RESULT VS WORK                       *                *                           *
   GROUP 1          38        2.8158       1.062        0.172     *                *                           *
                                                                  *  1.03   0.908  *  1.17     57       0.247  *   1.16      40.85       0.251
   GROUP 2          21        2.4762       1.078        0.235     *                *                           *
                                                                  *                *                           *
------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT   VALUE OF RANKING RESULT VS WORK                        *                *                           *
   GROUP 1          37        2.9459       0.998        0.164     *                *                           *
                                                                  *  1.09   0.858  *  0.86     56       0.392  *   0.87      43.22       0.388
   GROUP 2          21        2.7143       0.956        0.209     *                *                           *
                                                                  *                *                           *
------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT   ZBB MEAN FOR EFFECTIVE BUDGET                          *                *                           *
   GROUP 1          37        3.2162       1.205        0.198     *                *                           *
                                                                  *  1.55   0.311  *  1.01     55       0.317  *   1.08      46.82       0.287
   GROUP 2          20        2.9000       0.968        0.216     *                *                           *
                                                                  *                *                           *
------------------------------------------------------------------------------------------------------------------------------------------
```

Appendix E

NOFORMAT

```
SPSS BATCH SYSTEM                                                                              03/28/83        PAGE    9
TEST OF MEANS FOR HYPOTHESIS TWO

CPU TIME REQUIRED..     0.47 SECONDS


              43 T-TEST          GROUPS=NOFORMAT(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                              03/28/83        PAGE   10
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MOA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - NOFORMAT EQ          6.
GROUP 2 - NOFORMAT EQ          7.
                                                                                 * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                *                *                            *
VARIABLE              NUMBER               STANDARD    STANDARD  *    F    2-TAIL *    T    DEGREES OF 2-TAIL *    T    DEGREES OF   2-TAIL
                    OF CASES      MEAN    DEVIATION     ERROR   *  VALUE   PROB.  *  VALUE   FREEDOM    PROB. *  VALUE   FREEDOM     PROB.
-------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE  OF DEC PACK RESULT VS WORK                     *                 *                           *
     GROUP 1          11        3.0000       1.000       0.302   *                 *                           *
                                                                *  1.27   0.716   *  -0.87     52      0.387   *  -0.94     17.14      0.361
     GROUP 2          43        3.3256       1.128       0.172   *                 *                           *
                                                                *                 *                           *
-------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE  OF RANKING RESULT VS WORK                      *                 *                           *
     GROUP 1          11        3.4545       0.688       0.207   *                 *                           *
                                                                *  2.27   0.164   *   0.74     52      0.462   *   0.94     23.14      0.357
     GROUP 2          43        3.2093       1.036       0.158   *                 *                           *
                                                                *                 *                           *
-------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  Z08 MEAN FOR EFFECTIVE BUDGET                         *                 *                           *
     GROUP 1          10        2.9000       0.876       0.277   *                 *                           *
                                                                *  1.29   0.722   *  -1.75     50      0.086   *  -1.90     15.06      0.077
     GR)UP 2          42        3.5000       0.994       0.153   *                 *                           *
                                                                *                 *                           *
-------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                    03/28/83         PAGE   11
TEST OF MEANS FOR HYPOTHESIS TWO
CPU TIME REQUIRED..    0.49 SECONDS

            44 T-TEST          GROUPS=YSMBOFTR(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES    160 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                    03/28/83         PAGE   12
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID         DPT1         DPT2         DPT3         DPT4         DPT5         DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - YSMBOFTR EQ          6.
GROUP 2 - YSMBOFTR EQ          7.
                                                                             * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                             *                          *
VARIABLE          NUMBER               STANDARD     STANDARD  *    F   2-TAIL *    T   DEGREES OF 2-TAIL *    T   DEGREES OF  2-TAIL
                 OF CASES    MEAN     DEVIATION      ERROR    *  VALUE  PROB. *  VALUE  FREEDOM   PROB.  *  VALUE  FREEDOM    PROB.
-------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                    *               *                          *
     GROUP 1        35      2.9143        1.011        0.171  *               *                          *
                                                              *  0.00  1.000  *   1.87     34      0.071 *  11.20     34.00      0.000
     GROUP 2         1      1.0000        0.000        0.000  *               *                          *
                                                              *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                     *               *                          *
     GROUP 1        34      3.0588        0.919        0.158  *               *                          *
                                                              *  0.00  1.000  *   2.21     33      0.034 *  13.06     33.00      0.000
     GROUP 2         1      1.0000        0.000        0.000  *               *                          *
                                                              *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                       *               *                          *
     GROUP 1        35      3.2286        1.239        0.209  *               *                          *
                                                              *  0.00  1.000  *  15.42     34      0.000 *  15.42     34.00      0.000
     GROUP 2         0      0.0000        0.000        0.000  *               *                          *
                                                              *               *                          *
-------------------------------------------------------------------------------------------------------------------------------------
```

Appendix E

YSMBOFTR

```
SPSS BATCH SYSTEM                                                                   03/28/83         PAGE   13 Appendix E
TEST OF MEANS FOR HYPOTHESIS TWO                                                                               YSFREFTR
CPU TIME REQUIRED..     0.47 SECONDS


              45 T-TEST          GROUPS=YSFREFTR(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                   03/28/83         PAGE   14
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID         DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - YSFREFTR EQ           6.
GROUP 2 - YSFREFTR EQ           7.
                                                                         * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                            *                                       *
VARIABLE            NUMBER            STANDARD     STANDARD  *     F    2-TAIL *    T    DEGREES OF 2-TAIL *    T     DEGREES OF   2-TAIL
                   OF CASES    MEAN   DEVIATION      ERROR  *   VALUE   PROB.  *  VALUE    FREEDOM   PROB.  *  VALUE     FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                  *                  *                           *
     GROUP 1           17     2.4706      1.068      0.259  *                  *                           *
                                                            *   1.46  0.524    *  -0.05      19     0.962  *  -0.04      4.02       0.968
     GROUP 2            4     2.5000      1.291      0.645  *                  *                           *
                                                            *                  *                           *
------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                   *                  *                           *
     GROUP 1           17     2.5882      0.939      0.228  *                  *                           *
                                                            *   1.04  0.804    *  -1.26      19     0.222  *  -1.25      4.47       0.280
     GROUP 2            4     3.2500      0.957      0.479  *                  *                           *
                                                            *                  *                           *
------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                     *                  *                           *
     GROUP 1           16     2.8125      0.981      0.245  *                  *                           *
                                                            *   1.05  1.000    *  -0.80      18     0.434  *  -0.81      4.72       0.453
     GROUP 2            4     3.2500      0.957      0.479  *                  *                           *
                                                            *                  *                           *
------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                          03/28/83        PAGE   15  Appendix E
CPU TIME REQUIRED..    0.49 SECONDS                                                                                     NOMBOFTR


              46 T-TEST          GROUPS=NOMBOFTR(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                          03/28/83        PAGE   16
FILE    MBA     (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID        DPT1        DPT2        DPT3        DPT4        DPT5        DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - -
GROUP 1 - NOMBOFTR EQ        6.
GROUP 2 - NOMBOFTR EQ        7.
                                                                       * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE        NUMBER                 STANDARD   STANDARD  *                                  *
                                                            *    F   2-TAIL  *    T   DEGREES OF  2-TAIL *    T   DEGREES OF  2-TAIL
               OF CASES     MEAN     DEVIATION      ERROR   *  VALUE  PROB.  *  VALUE  FREEDOM   PROB.  *  VALUE   FREEDOM    PROB.
----------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                  *                *                          *
     GROUP 1       8      3.2500      0.886      0.313      *                *                          *
                                                            *  2.55  0.309   *  1.63      8     0.141   *  1.19     1.20      0.444
     GROUP 2       2      2.0000      1.414      1.000      *                *                          *
----------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                   *                *                          *
     GROUP 1       8      3.5000      0.756      0.267      *                *                          *
                                                            *  1.14  1.000   *  0.00      8     1.000   *  0.00     1.63      1.000
     GROUP 2       2      3.5000      0.707      0.500      *                *                          *
----------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  200 MEAN FOR EFFECTIVE BUDGET                     *                *                          *
     GROUP 1       7      3.0000      1.000      0.378      *                *                          *
                                                            *  2.00  0.988   *  0.65      7     0.538   *  0.80     2.34      0.509
     GROUP 2       2      2.5000      0.707      0.500      *                *                          *
----------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                      03/28/83        PAGE   17  Appendix E
CPU TIME REQUIRED..    0.48 SECONDS                                                                              NOFREFTR

              47 T-TEST         GROUPS=NOFREFTR(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                      03/28/83        PAGE   18
FILE    MBA        (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - NOFREFTR EQ          6.
GROUP 2 - NOFREFTR EQ          7.
                                                                       * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE           NUMBER              STANDARD     STANDARD   *     F    2-TAIL  *    T    DEGREES OF  2-TAIL  *    T    DEGREES OF   2-TAIL
                  OF CASES     MEAN    DEVIATION      ERROR     *  VALUE   PROB.   *  VALUE    FREEDOM    PROB.  *  VALUE    FREEDOM     PROB.
-------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                      *                  *                            *
    GROUP 1          12       3.1667      1.267       0.366     *                  *                            *
                                                                *   1.36   0.495   *  -0.72      39      0.477  *  -0.67     18.08      0.509
    GROUP 2          29       3.4483      1.088       0.202     *                  *                            *
-------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                       *                  *                            *
    GROUP 1          12       3.0000      1.128       0.326     *                  *                            *
                                                                *   1.44   0.424   *  -1.11      39      0.275  *  -1.03     17.68      0.318
    GROUP 2          29       3.3793      0.942       0.175     *                  *                            *
-------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                         *                  *                            *
    GROUP 1          12       3.4167      1.240       0.358     *                  *                            *
                                                                *   2.25   0.084   *  -0.68      38      0.501  *  -0.58     15.36      0.571
    GROUP 2          28       3.6429      0.826       0.156     *                  *                            *
-------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                        03/28/83      PAGE   19   Appendix E
TEST OF MEANS FOR HYPOTHESIS TWO
                  48 READ INPUT DATA

CPU TIME REQUIRED..     0.52 SECONDS


                  49 FINISH

        NORMAL END OF JOB.
           49 CONTROL CARDS WERE PROCESSED.
            0 ERRORS WERE DETECTED.
```

APPENDIX F

T-TEST OF THE SECOND HYPOTHESIS FOR EACH DEPARTMENT

```
SPSS BATCH SYSTEM                                                                  03/28/83        PAGE    1  Appendix F

SPSS FOR MULTICS/6880, VERSION H, RELEASE 8.0,  JULY 15, 1979
UNIVERSITY OF CALGARY, VERSION H, RELEASE 8.0B, OCTOBER 29, 1980
DEFAULT SPACE ALLOCATION..     ALLOWS FOR..    655 TRANSFORMATIONS
WORKSPACE     458748 BYTES                    2621 RECODE VALUES + LAG VARIABLES
TRANSPACE      65532 BYTES                   10486 IF/COMPUTE OPERATIONS

                  1 FILE NAME       MBA THESIS STATISTICAL SURVEY ANALYSIS
                  2 VARIABLE LIST   MBOPRIOR,FORMAT,MBOFUTUR,DPRESULT,RKRESULT,EFCTVBGT
                  3 INPUT MEDIUM    DISK
                  4 SUBFILE LIST    UNID (7) DPT1 (19) DPT2 (9) DPT3 (7) DPT4 (29) DPT5 (11)
                  5                 DPT6 (39)
                  6 INPUT FORMAT    FIXED (3X,3(1X,F1.0),10X,3(1X,F1.0),22X)

                  ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

                  VARIABLE  FORMAT  RECORD    COLUMNS

                  MBOPRIOR  F 1. 0       1     5-   5
                  FORMAT    F 1. 0       1     7-   7
                  MBOFUTUR  F 1. 0       1     9-   9
                  DPRESULT  F 1. 0       1    21-  21
                  RKRESULT  F 1. 0       1    23-  23
                  EFCTVBGT  F 1. 0       1    25-  25

THE INPUT FORMAT PROVIDES FOR    6 VARIABLES.    6 WILL BE READ
IT PROVIDES FOR  1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF    47 'COLUMNS' ARE USED ON A RECORD.

                 7 MISSING VALUES MBOPRIOR TO EFCTVBGT(0)/
                 8 VALUE LABELS   MBOPRIOR (6)MBO USER (7)NON USER (0)MISSING/
                 9                FORMAT (6)MBO USED (7)FREE USED (0)MISSING/
                10                MBOFUTUR (6)FUTURE USER (7)FUTURE NON USER (0)MISSING/
                11                DPRESULT TO EFCTVBGT (1)POOR (2)FAIR (3)ADEQUATE (4)GOOD
                12                (5)EXCELLENT (0)MISSING/
                13 VAR LABELS     MBOPRIOR PREVIOUS MBO USER/
                14                FORMAT FORMAT USED FOR R&O WITH ZBB/
                15                MBOFUTUR INTENDED FUTURE USE OF ZBB/
                16                DPRESULT VALUE OF DEC PACK RESULT VS WORK/
                17                RKRESULT VALUE OF RANKING RESULT VS WORK/
                18                EFCTVBGT ZBB MEAN FOR EFFECTIVE BUDGET/
                19 TASK NAME      TEST OF MEANS FOR HYPOTHESIS TWO
                20 RUN SUBFILES   (DPT1)(DPT2)(DPT3)(DPT4)(DPT5)(DPT6)
                21 T-TEST         GROUPS=MBOPRIOR(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****
```

```
SPSS BATCH SYSTEM                                                                                      03/28/83        PAGE    2  Appendix F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS                                                  Department 1
SUBFILE   DPT1                                                                                                                   MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                                  * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                                  *                          *
VARIABLE              NUMBER                 STANDARD     STANDARD  *                *   T    DEGREES OF 2-TAIL *    T    DEGREES OF  2-TAIL
                     OF CASES      MEAN     DEVIATION      ERROR    *  F     2-TAIL *  VALUE   FREEDOM    PROB.  *  VALUE   FREEDOM    PROB.
                                                                    *  VALUE PROB.  *
------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                          *               *                          *
      GROUP 1          6       2.1667       0.753        0.307      *               *                          *
                                                                    *  3.64  0.163  *  -1.81     17     0.087  *  -2.27    16.51     0.037
      GROUP 2         13       3.3077       1.437        0.398      *               *                          *
                                                                    *               *                          *
------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                           *               *                          *
      GROUP 1          6       2.5000       0.837        0.342      *               *                          *
                                                                    *  1.56  0.655  *  -1.82     17     0.087  *  -1.98    12.15     0.072
      GROUP 2         13       3.3846       1.044        0.290      *               *                          *
------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  Z8B MEAN FOR EFFECTIVE BUDGET                             *               *                          *
      GROUP 1          6       2.6667       1.211        0.494      *               *                          *
                                                                    *  1.12  0.800  *  -0.85     17     0.408  *  -0.83     9.31     0.428
      GROUP 2         13       3.1538       1.144        0.317      *               *                          *
                                                                    *               *                          *
------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                          03/28/83        PAGE    3  Appendix F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA        (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                           Department 2
SUBFILE    DPT2                                                                                                MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - -T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                          * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                        *                 *                           *
VARIABLE          NUMBER              STANDARD   STANDARD *   F    2-TAIL *    T   DEGREES OF 2-TAIL *    T   DEGREES OF  2-TAIL
                 OF CASES     MEAN   DEVIATION     ERROR  * VALUE   PROB. *  VALUE  FREEDOM   PROB.  *  VALUE  FREEDOM    PROB.
-------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK              *                 *                           *
       GROUP 1      8       3.3750     1.188      0.420  *                 *                           *
                                                        *  0.00  1.000   *   0.30      7      0.775  *   0.89     7.00     0.402
       GROUP 2      1       3.0000     0.000      0.000  *                 *                           *
-------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK               *                 *                           *
       GROUP 1      8       3.3750     0.744      0.263  *                 *                           *
                                                        *  0.00  1.000   *   0.48      7      0.649  *   1.43     7.00     0.197
       GROUP 2      1       3.0000     0.000      0.000  *                 *                           *
-------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                 *                 *                           *
       GROUP 1      7       3.5714     0.787      0.297  *                 *                           *
                                                        *  0.00  1.000   *  -0.51      6      0.629  *  -1.44     6.00     0.200
       GROUP 2      1       4.0000     0.000      0.000  *                 *                           *
-------------------------------------------------------------------------------------------------------------------------------
```

Appendix F
Department 3
MBOPRIOR

```
SPSS BATCH SYSTEM                                                                                  03/28/83        PAGE    4
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA        (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT3
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                            * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                  *                                    *
VARIABLE          NUMBER                 STANDARD     STANDARD    *     F     2-TAIL  *     T   DEGREES OF 2-TAIL *    T    DEGREES OF   2-TAIL
                 OF CASES       MEAN    DEVIATION       ERROR     *   VALUE   PROB.   *   VALUE   FREEDOM   PROB. *  VALUE    FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                        *                   *                           *
      GROUP 1       2         2.5000       2.121        1.500     *                   *                           *
                                                                  *   22.50   0.018   *   -1.97      5     0.105  *  -1.12      1.04       0.463
      GROUP 2       5         4.2000       0.447        0.200     *                   *                           *
                                                                  *                   *                           *
------------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                         *                   *                           *
      GROUP 1       2         3.5000       0.707        0.500     *                   *                           *
                                                                  *    2.50   0.378   *   -0.70      5     0.513  *  -0.56      1.34       0.676
      GROUP 2       5         3.8000       0.447        0.200     *                   *                           *
                                                                  *                   *                           *
------------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                           *                   *                           *
      GROUP 1       2         4.0000       1.414        1.000     *                   *                           *
                                                                  *    0.00   1.000   *    0.00      5     1.000  *   0.00      1.00       1.000
      GROUP 2       5         4.0000       0.000        0.000     *                   *                           *
                                                                  *                   *                           *
------------------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                             03/28/83        PAGE    5  APPENDIX F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                        Department 4
SUBFILE    DPT4
                                                                                                                         MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                   * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                       *                  *                             *
VARIABLE            NUMBER             STANDARD     STANDARD  *     F     2-TAIL  *    T    DEGREES OF  2-TAIL *    T    DEGREES OF   2-TAIL
                   OF CASES    MEAN    DEVIATION     ERROR    *   VALUE   PROB.   *  VALUE    FREEDOM    PROB. *  VALUE    FREEDOM     PROB.
-----------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                    *                   *                            *
     GROUP 1          16      2.6875      1.014       0.254   *                   *                            *
                                                              *   1.04  0.988     *  -1.02      24      0.320  *  -1.02     19.55      0.319
     GROUP 2          10      3.1000      0.994       0.314   *                   *                            *
                                                              *                   *                            *
-----------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                     *                   *                            *
     GROUP 1          15      2.8667      1.125       0.291   *                   *                            *
                                                              *   1.02  0.942     *  -0.72      23      0.477  *  -0.72     19.32      0.479
     GROUP 2          10      3.2000      1.135       0.359   *                   *                            *
                                                              *                   *                            *
-----------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                       *                   *                            *
     GROUP 1          15      3.0667      0.961       0.248   *                   *                            *
                                                              *   1.39  0.634     *   0.18      23      0.859  *   0.19     21.51      0.854
     GROUP 2          10      3.0000      0.816       0.258   *                   *                            *
                                                              *                   *                            *
-----------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                                  03/28/83          PAGE    6 Appendix F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                              Department 5
SUBFILE    DPT5
                                                                                                                               MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                      *                                      *
                                                                      * POOLED VARIANCE ESTIMATE  * SEPARATE VARIANCE ESTIMATE
                                                                      *                                      *
VARIABLE           NUMBER                STANDARD     STANDARD  *    F      2-TAIL  *     T     DEGREES OF  2-TAIL  *     T     DEGREES OF    2-TAIL
                   OF CASES     MEAN     DEVIATION     ERROR    *  VALUE    PROB.   *   VALUE     FREEDOM    PROB.   *   VALUE     FREEDOM      PROB.
-------------------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                      *                   *                                *
     GROUP 1          6        1.8333       0.753        0.307  *                   *                                *
                                                                *   1.62   0.595    *   -0.77        8      0.462    *   -0.73       5.43        0.497
     GROUP 2          4        2.2500       0.957        0.479  *                   *                                *
                                                                *                   *                                *
-------------------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                       *                   *                                *
     GROUP 1          6        2.0000       0.632        0.258  *                   *                                *
                                                                *   3.96   0.173    *   -1.26        8      0.242    *   -1.10       4.03        0.332
     GROUP 2          4        2.7500       1.258        0.629  *                   *                                *
                                                                *                   *                                *
-------------------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                         *                   *                                *
     GROUP 1          6        2.3333       1.033        0.422  *                   *                                *
                                                                *   1.16   0.961    *   -0.64        8      0.539    *   -0.65       6.95        0.535
     GROUP 2          4        2.7500       0.957        0.479  *                   *                                *
                                                                *                   *                                *
-------------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                                03/28/83        PAGE    7  Appendix F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA       (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS                                           Department 6
SUBFILE   DPT6
                                                                                                                            MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                             * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                   *                                    *
VARIABLE           NUMBER                  STANDARD     STANDARD   *    F    2-TAIL *    T    DEGREES OF  2-TAIL *    T    DEGREES OF   2-TAIL
                 OF CASES      MEAN       DEVIATION      ERROR     *  VALUE  PROB.  *  VALUE    FREEDOM    PROB. *  VALUE    FREEDOM     PROB.
---------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                         *                *                        *
     GROUP 1        19        2.9474       0.970        0.223      *                *                        *
                                                                   *   1.33  0.551  *  -1.79      36     0.082 *  -1.79      35.29      0.083
     GROUP 2        19        3.4737       0.841        0.193      *                *                        *
                                                                   *                *                        *
---------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                          *                *                        *
     GROUP 1        19        3.0000       1.000        0.229      *                *                        *
                                                                   *   1.12  0.816  *  -1.00      36     0.324 *  -1.00      35.89      0.324
     GROUP 2        19        3.3158       0.946        0.217      *                *                        *
                                                                   *                *                        *
---------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                            *                *                        *
     GROUP 1        19        3.3158       1.293        0.297      *                *                        *
                                                                   *   1.68  0.315  *  -1.57      33     0.126 *  -1.60      32.78      0.118
     GROUP 2        16        3.9375       0.998        0.249      *                *                        *
                                                                   *                *                        *
---------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                            03/28/83        PAGE    8  Appendix F
                                                                                                                       Department 1
CPU TIME REQUIRED..     3.69 SECONDS                                                                                   FORMAT

            22 T-TEST          GROUPS=FORMAT(6,7)/VARIABLES=DPRESULT,RKRESULT,EFCTVBGT

 ***** T-TEST PROBLEM REQUIRES     160 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                            03/28/83        PAGE    9
FILE    MDA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   DPT1

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ         6.
GROUP 2 - FORMAT    EQ         7.
                                                                   * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                   *                          *
VARIABLE         NUMBER               STANDARD    STANDARD  *    F    2-TAIL *    T   DEGREES OF 2-TAIL *    T   DEGREES OF  2-TAIL
                OF CASES     MEAN    DEVIATION      ERROR   *  VALUE  PROB.  *  VALUE   FREEDOM   PROB. *  VALUE   FREEDOM    PROB.
---------------------------------------------------------------------------------------------------------------------------------
DPRESULT   VALUE OF DEC PACK RESULT VS WORK                 *                *                          *
       GROUP 1         9      2.4444       0.882      0.294 *                *                          *
                                                            *   3.20  0.116  *  -1.60     17      0.127 *  -1.65    14.38      0.121
       GROUP 2        10      3.4000       1.578      0.499 *                *                          *
                                                            *                *                          *
---------------------------------------------------------------------------------------------------------------------------------
RKRESULT   VALUE OF RANKING RESULT VS WORK                  *                *                          *
       GROUP 1         9      2.8889       0.928      0.309 *                *                          *
                                                            *   1.56  0.541  *  -0.85     17      0.409 *  -0.86    16.80      0.403
       GROUP 2        10      3.3000       1.160      0.367 *                *                          *
                                                            *                *                          *
---------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT   ZBB MEAN FOR EFFECTIVE BUDGET                    *                *                          *
       GROUP 1         9      2.6667       1.225      0.408 *                *                          *
                                                            *   1.34  0.671  *  -1.21     17      0.243 *  -1.20    15.97      0.248
       GROUP 2        10      3.3000       1.059      0.335 *                *                          *
                                                            *                *                          *
---------------------------------------------------------------------------------------------------------------------------------
```

Appendix F
Department 2
FORMAT

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                          03/28/83         PAGE   10
FILE    MUA        (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT2

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ          6.
GROUP 2 - FORMAT    EQ          7.

                                                                    * POOLED VARIANCE ESTIMATE  * SEPARATE VARIANCE ESTIMATE
VARIABLE        NUMBER                STANDARD    STANDARD    *                     *
               OF CASES      MEAN    DEVIATION     ERROR      *   F     2-TAIL    *    T    DEGREES OF  2-TAIL *    T    DEGREES OF   2-TAIL
                                                              * VALUE    PROB.    *  VALUE    FREEDOM    PROB.  *  VALUE    FREEDOM     PROB.
--------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK
     GROUP 1        5       3.8000      0.837       0.374     *                   *                             *
     GROUP 2        4       2.7500      1.258       0.629     *  2.26   0.447     *   1.51       7      0.175   *   1.43     5.03       0.211
                                                              *                   *                             *
--------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK
     GROUP 1        5       3.8000      0.447       0.200     *                   *                             *
     GROUP 2        4       2.7500      0.500       0.250     *  1.25   0.806     *   3.33       7      0.013   *   3.28     6.17       0.017
                                                              *                   *                             *
--------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET
     GROUP 1        5       3.8000      0.447       0.200     *                   *                             *
     GROUP 2        3       3.3333      1.155       0.667     *  6.67   0.107     *   0.84       6      0.433   *   0.67     2.37       0.572
                                                              *                   *                             *
--------------------------------------------------------------------------------------------------------------------------------------------
```

Appendix F

Department 3

FORMAT

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS TWO                                                .03/28/83        PAGE   11
FILE   MBA        (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   DPT3
- - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ        6.
GROUP 2 - FORMAT    EQ        7.
                                                           *                  * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE          NUMBER              STANDARD   STANDARD  *     F    2-TAIL  *    T    DEGREES OF 2-TAIL *    T    DEGREES OF   2-TAIL
                 OF CASES     MEAN    DEVIATION    ERROR   *   VALUE   PROB.  *  VALUE    FREEDOM   PROB. *  VALUE    FREEDOM     PROB.
---------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                 *                  *                           *
     GROUP 1         3       3.0000     1.732      1.000   *                  *                           *
                                                           *  12.00   0.074   *  -1.41      5      0.218  *  -1.21      2.25       0.349
     GROUP 2         4       4.2500     0.500      0.250   *                  *                           *
                                                           *                  *                           *
---------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                  *                  *                           *
     GROUP 1         3       3.6667     0.577      0.333   *                  *                           *
                                                           *   1.33   0.770   *  -0.20      5      0.846  *  -0.20      4.03       0.851
     GROUP 2         4       3.7500     0.500      0.250   *                  *                           *
                                                           *                  *                           *
---------------------------------------------------------------------------------------------------------------------------------------



EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                    *                  *                           *
     GROUP 1         3       4.0000     1.000      0.577   *                  *                           *
                                                           *   0.00   1.000   *   0.00      5      1.000  *   0.00      2.00       1.000
     GROUP 2         4       4.0000     0.000      0.000   *                  *                           *
                                                           *                  *                           *
---------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                                     03/28/83          PAGE   12 Appendix F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                                  Department 4
SUBFILE    DPT4                                                                                                                   FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ         6.
GROUP 2 - FORMAT    EQ         7.
                                                                                  * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                 *                *                          *
VARIABLE             NUMBER                STANDARD     STANDARD *     F   2-TAIL *    T    DEGREES OF 2-TAIL *    T    DEGREES OF   2-TAIL
                    OF CASES      MEAN    DEVIATION       ERROR  *  VALUE  PROB.  *  VALUE    FREEDOM   PROB. *  VALUE    FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                       *                *                          *
     GROUP 1           12       2.8333       1.030        0.297  *                *                          *
                                                                 *   1.08  0.875  *  -0.09      25     0.933 *  -0.09      23.28       0.933
     GROUP 2           15       2.8667       0.990        0.256  *                *                          *
                                                                 *                *                          *
------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                        *                *                          *
     GROUP 1           11       2.9091       1.136        0.343  *                *                          *
                                                                 *   1.00  0.968  *  -0.20      24     0.842 *  -0.20      21.68       0.842
     GROUP 2           15       3.0000       1.134        0.293  *                *                          *
                                                                 *                *                          *
------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                          *                *                          *
     GROUP 1           11       3.0909       1.044        0.315  *                *                          *
                                                                 *   1.71  0.348  *   0.44      24     0.666 *   0.42      18.05       0.680
     GROUP 2           15       2.9333       0.799        0.206  *                *                          *
                                                                 *                *                          *
------------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                                      03/28/83        PAGE   13  Appendix F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE    M9A      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS                                                 Department 5
SUBFILE    DPT5                                                                                                                  FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ        6.
GROUP 2 - FORMAT    EQ        7.
                                                                     *                 * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                     *                 *                          *
VARIABLE            NUMBER             STANDARD     STANDARD        *    F    2-TAIL   *    T    DEGREES OF 2-TAIL *    T    DEGREES OF   2-TAIL
                   OF CASES    MEAN   DEVIATION      ERROR          *  VALUE  PROB.    *  VALUE    FREEDOM   PROB. *  VALUE    FREEDOM     PROB.
-----------------------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK                          *                  *                          *
     GROUP 1           3      1.6667      1.155        0.667        *                  *                          *
                                                                    *  2.67  0.275     *  -1.04       9     0.325 *  -0.82       2.59      0.473
     GROUP 2           8      2.2500      0.707        0.250        *                  *                          *
                                                                    *                  *                          *
-----------------------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                           *                  *                          *
     GROUP 1           3      3.0000      1.000        0.577        *                  *                          *
                                                                    *  1.70  0.840     *   0.74       9     0.476 *   0.85       4.80      0.436
     GROUP 2           8      2.3750      1.302        0.460        *                  *                          *
                                                                    *                  *                          *
-----------------------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  ZBB MEAN FOR EFFECTIVE BUDGET                              *                  *                          *
     GROUP 1           3      2.0000      1.000        0.577        *                  *                          *
                                                                    *  1.02  0.818     *  -1.30       9     0.225 *  -1.30       3.60      0.265
     GROUP 2           8      2.8750      0.991        0.350        *                  *                          *
                                                                    *                  *                          *
-----------------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                            03/28/83        PAGE   14  Appendix F
TEST OF MEANS FOR HYPOTHESIS TWO
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS                                        Department 6
SUBFILE   DPT6                                                                                                         FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT   EQ        6.
GROUP 2 - FORMAT   EQ        7.
                                                                        * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                         *              *                          *
VARIABLE          NUMBER              STANDARD   STANDARD *   F   2-TAIL *   T   DEGREES OF 2-TAIL *   T   DEGREES OF  2-TAIL
                 OF CASES    MEAN    DEVIATION    ERROR  * VALUE  PROB.  * VALUE   FREEDOM   PROB. * VALUE   FREEDOM    PROB.
------------------------------------------------------------------------------------------------------------------------------
DPRESULT  VALUE OF DEC PACK RESULT VS WORK               *              *                          *
   GROUP 1          16      2.9375     0.929      0.232  *              *                          *
                                                         *  1.06  0.924  *  -1.11     35     0.274 *  -1.12    32.91      0.273
   GROUP 2          21      3.2857     0.956      0.209  *              *                          *
                                                         *              *                          *
------------------------------------------------------------------------------------------------------------------------------
RKRESULT  VALUE OF RANKING RESULT VS WORK                *              *                          *
   GROUP 1          16      2.8750     1.025      0.256  *              *                          *
                                                         *  1.18  0.718  *  -1.12     35     0.271 *  -1.10    30.95      0.278
   GROUP 2          21      3.2381     0.944      0.206  *              *                          *
                                                         *              *                          *
------------------------------------------------------------------------------------------------------------------------------
EFCTVBGT  Z88 MEAN FOR EFFECTIVE BUDGET                  *              *                          *
   GROUP 1          15      3.4667     1.302      0.336  *              *                          *
                                                         *  1.33  0.553  *  -0.57     33     0.575 *  -0.56    27.73      0.583
   GROUP 2          20      3.7000     1.129      0.252  *              *                          *
                                                         *              *                          *
------------------------------------------------------------------------------------------------------------------------------
```

Appendix F

```
SPSS BATCH SYSTEM                                                    03/28/83          PAGE   15
TEST OF MEANS FOR HYPOTHESIS TWO
                  24 READ INPUT DATA

CPU TIME REQUIRED..     1.06 SECONDS


                  25 FINISH

            NORMAL END OF JOB.
              25 CONTROL CARDS WERE PROCESSED.
               0 ERRORS WERE DETECTED.
```

APPENDIX G

T-TEST OF THE THIRD HYPOTHESIS FOR THE TOTAL SAMPLE

Appendix G

```
SPSS BATCH SYSTEM                                                                    03/28/83         PAGE    1

SPSS FOR MULTICS/6880, VERSION H, RELEASE 8.0,  JULY 15, 1979
UNIVERSITY OF CALGARY, VERSION H, RELEASE 8.0B, OCTOBER 29, 1980
DEFAULT SPACE ALLOCATION..     ALLOWS FOR..    655 TRANSFORMATIONS
WORKSPACE     458748 BYTES                    2621 RECODE VALUES + LAG VARIABLES
TRANSPACE      65532 BYTES                   10486 IF/COMPUTE OPERATIONS

                 1 FILE NAME       MBA THESIS STATISTICAL SURVEY ANALYSIS
                 2 VARIABLE LIST   MBOPRIOR,FORMAT,MBOFUTUR,HRSFIRST,LEARN,DOCUMENT,HRSNEXT
                 3 INPUT MEDIUM    DISK
                 4 SUBFILE LIST    UNIO (7) DPT1 (19) DPT2 (9) DPT3 (7) DPT4 (29) DPT5 (11)
                 5                 DPT6 (39)
                 6 INPUT FORMAT    FIXED (3X,3(1X,F1.0),21X,F3.0,2(1X,F2.0),1X,F3.0,4X)

                  ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

                  VARIABLE  FORMAT  RECORD    COLUMNS

                  MBOPRIOR  F 1. 0       1     5-   5
                  FORMAT    F 1. 0       1     7-   7
                  MBOFUTUR  F 1. 0       1     9-   9
                  HRSFIRST  F 3. 0       1    31-  33
                  LEARN     F 2. 0       1    35-  36
                  DOCUMENT  F 2. 0       1    38-  39
                  HRSNEXT   F 3. 0       1    41-  43

THE INPUT FORMAT PROVIDES FOR   7 VARIABLES.    7 WILL BE READ
IT PROVIDES FOR  1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF   47 'COLUMNS' ARE USED ON A RECORD.

                 7 MISSING VALUES MBOPRIOR TO MBOFUTUR (0)/HRSFIRST,HRSNEXT(000)/
                 8                 LEARN,DOCUMENT(00)/
                 9 VALUE LABELS    MBOPRIOR (6)MBO USER (7)NON USER (0)MISSING/
                10                 FORMAT (6)MBO USED (7)FREE USED (0)MISSING/
                11                 MBOFUTUR (6)FUTURE USER (7)FUTURE NON USER (0)MISSING/
                12 VAR LABELS      MBOPRIOR PREVIOUS MBO USER/
                13                 FORMAT FORMAT USED FOR R&O WITH ZBB/
                14                 MBOFUTUR INTENDED FUTURE USE OF ZBB/
                15                 HRSFIRST HRS SPENT FIRST ZBB/
                16                 LEARN PERCENT TIME SPENT LEARNING ZBB/
                17                 DOCUMENT PERCENT TIME SPENT DOCUMENTING ZBB/
                18                 HRSNEXT EST HRS ZBB WILL REQUIRE NEXT TIME/
                19 TASK NAME       TEST OF MEANS FOR HYPOTHESIS THREE
                20 SELECT IF       (LEARN GT 00)
                21 SELECT IF       (DOCUMENT GT 00)
                22 SELECT IF       (HRSFIRST GT 000)
                23 COMPUTE         LEARNHRS=(LEARN*HRSFIRST)/100
                24 COMPUTE         DOCUMHRS=(DOCUMENT*HRSFIRST)/100
                25 IF              (MBOPRIOR EQ 6 AND FORMAT EQ 6) YSFORMAT=6
                26 IF              (MBOPRIOR EQ 6 AND FORMAT EQ 7) YSFORMAT=7
                27 IF              (MBOPRIOR EQ 7 AND FORMAT EQ 6) NOFORMAT=6
                28 IF              (MBOPRIOR EQ 7 AND FORMAT EQ 7) NOFORMAT=7
                29 IF              (MBOPRIOR EQ 6 AND FORMAT EQ 6 AND MBOFUTUR EQ 6) YSMBOFTR=6
                30 IF              (MBOPRIOR EQ 6 AND FORMAT EQ 6 AND MBOFUTUR EQ 7) YSMBOFTR=7
                31 IF              (MBOPRIOR EQ 6 AND FORMAT EQ 7 AND MBOFUTUR EQ 6) YSFREFTR=6
                32 IF              (MBOPRIOR EQ 6 AND FORMAT EQ 7 AND MBOFUTUR EQ 7) YSFREFTR=7
                33 IF              (MBOPRIOR EQ 7 AND FORMAT EQ 6 AND MBOFUTUR EQ 6) NOMBOFTR=6
                34 IF              (MBOPRIOR EQ 7 AND FORMAT EQ 6 AND MBOFUTUR EQ 7) NOMBOFTR=7
                35 IF              (MBOPRIOR EQ 7 AND FORMAT EQ 7 AND MBOFUTUR EQ 6) NOFREFTR=6
                36 IF              (MBOPRIOR EQ 7 AND FORMAT EQ 7 AND MBOFUTUR EQ 7) NOFREFTR=7
                37 VAR LABELS      LEARNHRS HRS REQUIRED TO LEARN ZBB/
                38                 DOCUMHRS HRS REQUIRED TO DOCUMENT ZBB/
                39                 YSFORMAT FORMAT USED WITH ZBB BY MBO USER/
                40                 NOFORMAT FORMAT USED WITH ZBB BY NON USER/
                41                 YSMBOFTR INTED MBO FTR USE BY USER PRIOR & ZBB/
                42                 YSFREFTR INTED MBO FTR USE BY USER PRIOR &FREE/
                43                 NOMBOFTR INTED MBO FTR USE BY NONUSER &WTH ZBB/
                44                 NOFREFTR INTED MBO FTR USE BY NONUSER &FREEUSE/
                45 RUN SUBFILES    ALL
                46 T-TEST          GROUPS=MBOPRIOR(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

***** T-TEST PROBLEM REQUIRES     208 BYTES OF WORKSPACE *****
```

```
SPSS BATCH SYSTEM                                                                              03/28/83        PAGE    2 Appendix G
TEST OF MEANS FOR HYPOTHESIS THREE
FILE   MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                         MBOPRIOR
SUBFILE   UNID        DPT1        DPT2        DPT3        DPT4        DPT5        DPT6

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ           6.
GROUP 2 - MBOPRIOR EQ           7.
                                                                             * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                *            *
VARIABLE          NUMBER                STANDARD     STANDARD   *    F    2-TAIL *    T   DEGREES OF 2-TAIL *    T   DEGREES OF  2-TAIL
                OF CASES     MEAN      DEVIATION       ERROR    *  VALUE  PROB.  *  VALUE   FREEDOM   PROB. *  VALUE   FREEDOM    PROB.
----------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                   *                *                          *
     GROUP 1       54       83.6657     110.073       14.979    *                *                          *
                                                                *   7.15  0.000  *   2.04     105     0.044 *   2.05     67.78      0.044
     GROUP 2       53       50.8491      41.173        5.656    *                *                          *
                                                                *                *                          *
----------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                             *                *                          *
     GROUP 1       54       19.5783      23.571        3.208    *                *                          *
                                                                *   6.41  0.000  *   2.32     105     0.023 *   2.33     69.39      0.023
     GROUP 2       53       11.5292       9.308        1.278    *                *                          *
                                                                *                *                          *
----------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                          *                *                          *
     GROUP 1       54       33.0380      54.124        7.365    *                *                          *
                                                                *  10.69  0.000  *   1.93     105     0.056 *   1.95     63.00      0.056
     GROUP 2       53       18.0066      16.554        2.274    *                *                          *
                                                                *                *                          *
----------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                    *                *                          *
     GROUP 1       52       65.0577     114.060       15.817    *                *                          *
                                                                *  12.12  0.000  *   1.99     103     0.049 *   1.98     59.21      0.053
     GROUP 2       53       32.5472      32.762        4.500    *                *                          *
                                                                *                *                          *
----------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                      03/28/83        PAGE    3  Appendix G
TEST OF MEANS FOR HYPOTHESIS THREE                                                                                FORMAT
TRANSPACE REQUIRED..     1700 BYTES
     17 TRANSFORMATIONS
      0 RECODE VALUES + LAG VARIABLES
    157 IF/COMPUTE OPERATIONS

CPU TIME REQUIRED..    5.99 SECONDS


               47 T-TEST          GROUPS=FORMAT(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                      03/28/83        PAGE    4
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MDA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    UNID         DPT1         DPT2         DPT3         DPT4         DPT5         DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ          6.
GROUP 2 - FORMAT    EQ          7.
                                                                              * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                 *            *                            *
VARIABLE           NUMBER              STANDARD    STANDARD      *   F  2-TAIL *   T   DEGREES OF 2-TAIL  *   T    DEGREES OF  2-TAIL
                 OF CASES      MEAN    DEVIATION      ERROR      * VALUE PROB. * VALUE  FREEDOM   PROB.  * VALUE  FREEDOM    PROB.
-------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                    *             *                          *
     GROUP 1        47     84.0638    115.607      16.863        *             *                          *
                                                                 * 6.17  0.000 *  1.66    106     0.100   *  1.51   57.51     0.137
     GROUP 2        61     57.0820     46.523       5.957        *             *                          *
                                                                 *             *                          *
-------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                              *             *                          *
     GROUP 1        47     16.0357     21.478       3.133        *             *                          *
                                                                 * 1.85  0.025 *  0.02    106     0.985   *  0.02   81.43     0.986
     GROUP 2        61     15.9689     15.782       2.021        *             *                          *
                                                                 *             *                          *
-------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                           *             *                          *
     GROUP 1        47     31.4468     56.558       8.250        *             *                          *
                                                                 * 7.38  0.000 *  1.27    106     0.207   *  1.15   55.64     0.255
     GROUP 2        61     21.4820     20.819       2.666        *             *                          *
                                                                 *             *                          *
-------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                     *             *                          *
     GROUP 1        47     67.9149    119.875      17.486        *             *                          *
                                                                 *12.77  0.000 *  2.00    104     0.048   *  1.81   51.76     0.076
     GROUP 2        59     35.2712     33.546       4.367        *             *                          *
                                                                 *             *                          *
-------------------------------------------------------------------------------------------------------------------------------------
```

Appendix G

MBOFUTUR

```
SPSS BATCH SYSTEM                                                                              03/28/83        PAGE    5
TEST OF MEANS FOR HYPOTHESIS THREE
CPU TIME REQUIRED..     0.47 SECONDS

          48 T-TEST           GROUPS=MBOFUTUR(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                              03/28/83        PAGE    6
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MBA         (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOFUTUR EQ          6.
GROUP 2 - MBOFUTUR EQ          7.
                                                                          * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                          *                          *
VARIABLE              NUMBER                STANDARD      STANDARD   *    F     2-TAIL  *    T    DEGREES OF  2-TAIL *    T     DEGREES OF   2-TAIL
                     OF CASES     MEAN      DEVIATION       ERROR    *  VALUE   PROB.   *  VALUE    FREEDOM    PROB.  *  VALUE    FREEDOM     PROB.
----------------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST   HRS SPENT FIRST ZBB                                        *                  *                            *
      GROUP 1        69       76.6087       99.357       11.961   *                  *                            *
                                                                  *   7.26   0.000   *   1.54     101      0.127   *   2.01     95.90      0.047
      GROUP 2        34       49.4412       36.882        6.325   *                  *                            *
                                                                  *                  *                            *
----------------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS   HRS REQUIRED TO LEARN ZBB                                  *                  *                            *
      GROUP 1        69       17.3367       21.366        2.572   *                  *                            *
                                                                  *   3.83   0.000   *   1.04     101      0.303   *   1.27    100.83      0.207
      GROUP 2        34       13.2985       10.915        1.872   *                  *                            *
                                                                  *                  *                            *
----------------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS   HRS REQUIRED TO DOCUMENT ZBB                               *                  *                            *
      GROUP 1        69       28.9833       48.801        5.875   *                  *                            *
                                                                  *   8.73   0.000   *   1.17     101      0.247   *   1.54     92.93      0.127
      GROUP 2        34       18.9368       16.513        2.832   *                  *                            *
                                                                  *                  *                            *
----------------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT    EST HRS ZBB WILL REQUIRE NEXT TIME                         *                  *                            *
      GROUP 1        67       56.6716      101.564       12.408   *                  *                            *
                                                                  *  13.25   0.000   *   1.45      99      0.151   *   1.93     83.40      0.056
      GROUP 2        34       30.9412       27.901        4.785   *                  *                            *
                                                                  *                  *                            *
----------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                         03/28/83        PAGE    7 Appendix G
CPU TIME REQUIRED..    0.47 SECONDS                                                                  YSFORMAT


          49 T-TEST          GROUPS=YSFORMAT(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                          03/28/83        PAGE    8
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID         DPT1         DPT2         DPT3         DPT4         DPT5         DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - YSFORMAT EQ         6.
GROUP 2 - YSFORMAT EQ         7.
                                                                                * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE          NUMBER               STANDARD     STANDARD  *                 *                          *
                 OF CASES      MEAN   DEVIATION       ERROR  *   F     2-TAIL  *   T   DEGREES OF 2-TAIL  *   T    DEGREES OF   2-TAIL
                                                              *  VALUE  PROB.   * VALUE   FREEDOM   PROB.  * VALUE    FREEDOM     PROB.
--------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                 *                 *                          *
    GROUP 1        35        92.2571     131.415      22.213  *                 *                          *
                                                              *  6.53  0.000    *  0.78     52     0.442   *  0.97     48.59      0.336
    GROUP 2        19        67.8421      51.441      11.801  *                 *                          *
                                                              *                 *                          *
--------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                           *                 *                          *
    GROUP 1        35        17.0851      24.395       4.123  *                 *                          *
                                                              *  1.25  0.631    * -1.06     52     0.296   * -1.09     40.73      0.281
    GROUP 2        19        24.1711      21.851       5.013  *                 *                          *
                                                              *                 *                          *
--------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                        *                 *                          *
    GROUP 1        35        35.5914      64.451      10.894  *                 *                          *
                                                              *  5.59  0.000    *  0.47     52     0.642   *  0.58     49.87      0.566
    GROUP 2        19        28.3342      27.259       6.254  *                 *                          *
                                                              *                 *                          *
--------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                  *                 *                          *
    GROUP 1        35        76.3429     136.798      23.123  *                 *                          *
                                                              * 22.01  0.000    *  1.02     50     0.311   *  1.43     39.92      0.161
    GROUP 2        17        41.8235      29.157       7.072  *                 *                          *
                                                              *                 *                          *
--------------------------------------------------------------------------------------------------------------------------------------
```

Appendix G
NOFORMAT

```
SPSS BATCH SYSTEM                                                                    03/28/83        PAGE    9
TEST OF MEANS FOR HYPOTHESIS THREE

CPU TIME REQUIRED..     0.47 SECONDS


          50 T-TEST         GROUPS=NOFORMAT(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES     208 BYTES OF WORKSPACE *****


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                    03/28/83        PAGE   10
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    UNID          DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - NOFORMAT EQ          6.
GROUP 2 - NOFORMAT EQ          7.
                                                                              * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                *                                        *
VARIABLE            NUMBER                STANDARD      STANDARD  *     F   2-TAIL  *     T   DEGREES OF 2-TAIL *     T   DEGREES OF  2-TAIL
                   OF CASES      MEAN    DEVIATION        ERROR   *  VALUE  PROB.   *  VALUE   FREEDOM   PROB.  *  VALUE   FREEDOM    PROB.
------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                     *                 *                           *
     GROUP 1          11       57.4545      41.753      12.589    *                 *                           *
                                                                  *  1.01   0.909   *   0.54      50     0.592  *   0.54     15.76      0.598
     GROUP 2          41       49.8293      41.606       6.498    *                 *                           *
                                                                  *                 *                           *
------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                               *                 *                           *
     GROUP 1          11       11.7000       7.876       2.375    *                 *                           *
                                                                  *  1.55   0.469   *   0.02      50     0.986  *   0.02     19.20      0.984
     GROUP 2          41       11.6427       9.799       1.530    *                 *                           *
                                                                  *                 *                           *
------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                            *                 *                           *
     GROUP 1          11       17.0273      16.857       5.083    *                 *                           *
                                                                  *  1.00   0.914   *  -0.25      50     0.802  *  -0.25     15.78      0.805
     GROUP 2          41       18.4646      16.826       2.628    *                 *                           *
                                                                  *                 *                           *
------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                      *                 *                           *
     GROUP 1          11       41.8182      38.361      11.566    *                 *                           *
                                                                  *  1.48   0.369   *   1.04      50     0.302  *   0.93     13.85      0.368
     GROUP 2          41       30.1220      31.585       4.933    *                 *                           *
                                                                  *                 *                           *
------------------------------------------------------------------------------------------------------------------------------------
```

Appendix G

YSMBOFTR

```
SPSS BATCH SYSTEM                                                                         03/28/83          PAGE   11
TEST OF MEANS FOR HYPOTHESIS THREE
CPU TIME REQUIRED..    0.47 SECONDS


             51 T-TEST          GROUPS=YSMBOFTR(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                         03/28/83          PAGE   12
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID          DPT1        DPT2        DPT3        DPT4        DPT5        DPT6

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - YSMBOFTR EQ          6.
GROUP 2 - YSMBOFTR EQ          7.
                                                                        * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                  *                                *
VARIABLE         NUMBER                STANDARD      STANDARD     *     F     2-TAIL  *    T     DEGREES OF  2-TAIL *    T      DEGREES OF    2-TAIL
                OF CASES      MEAN    DEVIATION       ERROR       *   VALUE   PROB.   *  VALUE    FREEDOM    PROB.  *  VALUE     FREEDOM      PROB.
-----------------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                     *                   *                           *
     GROUP 1       33      95.1818      134.830       23.471      *                   *                           *
                                                                  *    0.00   1.000   *   4.06      32     0.000  *   4.06       32.00       0.000
     GROUP 2        0       0.0000        0.000        0.000      *                   *                           *
-----------------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                               *                   *                           *
     GROUP 1       33      17.5145       25.059        4.362      *                   *                           *
                                                                  *    0.00   1.000   *   4.01      32     0.000  *   4.01       32.00       0.000
     GROUP 2        0       0.0000        0.000        0.000      *                   *                           *
-----------------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                            *                   *                           *
     GROUP 1       33      36.0818       66.204       11.525      *                   *                           *
                                                                  *    0.00   1.000   *   3.13      32     0.004  *   3.13       32.00       0.004
     GROUP 2        0       0.0000        0.000        0.000      *                   *                           *
-----------------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT    EST HRS ZBB WILL REQUIRE NEXT TIME                     *                   *                           *
     GROUP 1       33      78.7273      140.526       24.462      *                   *                           *
                                                                  *    0.00   1.000   *   3.22      32     0.003  *   3.22       32.00       0.003
     GROUP 2        0       0.0000        0.000        0.000      *                   *                           *
-----------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                            03/28/83        PAGE   13  Appendix G
TEST OF MEANS FOR HYPOTHESIS THREE                                                                                      YSFREFTR
CPU TIME REQUIRED..    0.45 SECONDS

            52 T-TEST          GROUPS=YSFREFTR(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                            03/28/83        PAGE   14
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID           DPT1          DPT2          DPT3          DPT4          DPT5          DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - YSFREFTR EQ          6.
GROUP 2 - YSFREFTR EQ          7.
                                                                          * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE            NUMBER                STANDARD      STANDARD  *     F    2-TAIL  *     T    DEGREES OF 2-TAIL *     T    DEGREES OF   2-TAIL
                   OF CASES     MEAN      DEVIATION       ERROR   *   VALUE   PROB.  *   VALUE    FREEDOM   PROB. *   VALUE    FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                     *                  *                            *
      GROUP 1        16       64.9375       51.710       12.928   *                  *                            *
                                                                  *   1.25   0.631   *   -0.56      17      0.585 *   -0.51      2.64       0.642
      GROUP 2         3       83.3333       57.735       33.333   *                  *                            *
------------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                               *                  *                            *
      GROUP 1        16       24.3281       23.558        5.890   *                  *                            *
                                                                  *   4.16   0.421   *    0.07      17      0.945 *    0.11      5.86       0.915
      GROUP 2         3       23.3333       11.547        6.667   *                  *                            *
------------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                            *                  *                            *
      GROUP 1        16       30.6781       29.199        7.300   *                  *                            *
                                                                  *  58.46   0.034   *    0.86      17      0.402 *    1.95     16.81       0.068
      GROUP 2         3       15.8333        3.819        2.205   *                  *                            *
------------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                      *                  *                            *
      GROUP 1        14       39.3571       27.250        7.283   *                  *                            *
                                                                  *   2.33   0.272   *   -0.74      15      0.469 *   -0.56      2.38       0.634
      GROUP 2         3       53.3333       41.633       24.037   *                  *                            *
------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                     03/28/83        PAGE   15  Appendix G
CPU TIME REQUIRED..    0.45 SECONDS                                                               NOMBOFTR


          53 T-TEST         GROUPS=NOMBOFTR(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES     208 BYTES OF WORKSPACE *****



- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                     03/28/83        PAGE   16
FILE    MBA       (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   UNID        DPT1        DPT2        DPT3        DPT4        DPT5        DPT6
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - -
GROUP 1 - NOMBOFTR EQ          6.
GROUP 2 - NOMBOFTR EQ          7.
                                                                          * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE           NUMBER                STANDARD     STANDARD   *                    *                                   *
                 OF CASES      MEAN     DEVIATION        ERROR   *    F   2-TAIL    *      T    DEGREES OF  2-TAIL *      T    DEGREES OF   2-TAIL
                                                                 *  VALUE  PROB.    *  VALUE     FREEDOM    PROB.  *  VALUE     FREEDOM      PROB.
-------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                    *                  *                              *
       GROUP 1        8     54.2500      35.205       12.447     *                  *                              *
                                                                 *  4.03  0.169     *  -1.09       8       0.306   *  -0.69      1.13       0.614
       GROUP 2        2     90.0000      70.711       50.000     *                  *                              *
-------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                              *                  *                              *
       GROUP 1        8     12.6000       7.618        2.693     *                  *                              *
                                                                 *  1.46  0.533     *  -0.15       8       0.888   *  -0.13      1.37       0.919
       GROUP 2        2     13.5000       9.192        6.500     *                  *                              *
-------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                           *                  *                              *
       GROUP 1        8     13.7000      12.853        4.544     *                  *                              *
                                                                 *  6.40  0.078     *  -1.47       8       0.180   *  -0.82      1.08       0.562
       GROUP 2        2     33.0000      32.527       23.000     *                  *                              *
-------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                     *                  *                              *
       GROUP 1        8     35.6250      22.595        7.989     *                  *                              *
                                                                 * 14.10  0.014     *  -1.53       8       0.165   *  -0.73      1.04       0.597
       GROUP 2        2     80.0000      84.853       60.000     *                  *                              *
-------------------------------------------------------------------------------------------------------------------------------------
```

Appendix G

NOFREFTR

```
SPSS BATCH SYSTEM                                                                      03/28/83        PAGE   17
TEST OF MEANS FOR HYPOTHESIS THREE
CPU TIME REQUIRED..     0.46 SECONDS

               54 T-TEST           GROUPS=NOFREFTR(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES     208 BYTES OF WORKSPACE *****


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM                                                                      03/28/83        PAGE   18
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    UNID          DPT1          DPT2         DPT3         DPT4          DPT5          DPT6

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - NOFREFTR EQ           6.
GROUP 2 - NOFREFTR EQ           7.
                                                                             * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE          NUMBER                  STANDARD       STANDARD   *                    *                                 *
                 OF CASES      MEAN       DEVIATION        ERROR    *   F     2-TAIL     *    T     DEGREES OF  2-TAIL  *    T     DEGREES OF    2-TAIL
                                                                    *  VALUE   PROB.     *  VALUE    FREEDOM    PROB.  *  VALUE    FREEDOM      PROB.
-----------------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                       *                    *                             *
     GROUP 1        11        52.9091       41.050         12.377   *                    *                             *
                                                                    *  1.86   0.190      *   0.83      38       0.413  *   0.72      14.28       0.484
     GROUP 2        29        43.1379       30.081          5.586   *                    *                             *
-----------------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                                 *                    *                             *
     GROUP 1        11         9.2000        6.564          1.979   *                    *                             *
                                                                    *  2.69   0.102      *  -0.87      38       0.387  *  -1.08      29.76       0.287
     GROUP 2        29        12.2466       10.767          1.999   *                    *                             *
-----------------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                              *                    *                             *
     GROUP 1        11        14.8818       13.130          3.959   *                    *                             *
                                                                    *  1.55   0.475      *  -0.62      38       0.540  *  -0.68      22.43       0.502
     GROUP 2        29        18.2879       16.339          3.034   *                    *                             *
-----------------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                        *                    *                             *
     GROUP 1        11        27.5455       15.870          4.785   *                    *                             *
                                                                    *  1.10   0.923      *   0.40      38       0.695  *   0.40      18.92       0.690
     GROUP 2        29        25.2414       16.651          3.092   *                    *                             *
-----------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                   03/28/83       PAGE   19 Appendix G
TEST OF MEANS FOR HYPOTHESIS THREE
                55 READ INPUT DATA

CPU TIME REQUIRED..     0.50 SECONDS


                56 FINISH

            NORMAL END OF JOB.
               56 CONTROL CARDS WERE PROCESSED.
                0 ERRORS WERE DETECTED.
```

APPENDIX H

T-TEST OF THE THIRD HYPOTHESIS FOR EACH DEPARTMENT

Appendix H

```
SPSS BATCH SYSTEM                                                     03/28/83        PAGE    1

SPSS FOR MULTICS/6880, VERSION H, RELEASE 8.0, JULY 15, 1979
UNIVERSITY OF CALGARY, VERSION H, RELEASE 8.0B, OCTOBER 29, 1980
DEFAULT SPACE ALLOCATION..     ALLOWS FOR..   655 TRANSFORMATIONS
WORKSPACE    458748 BYTES                    2621 RECODE VALUES + LAG VARIABLES
TRANSPACE     65532 BYTES                   10486 IF/COMPUTE OPERATIONS

                 1 FILE NAME       MBA THESIS STATISTICAL SURVEY ANALYSIS
                 2 VARIABLE LIST   MBOPRIOR,FORMAT,MBOFUTUR,HRSFIRST,LEARN,DOCUMENT,HRSNEXT
                 3 INPUT MEDIUM    DISK
                 4 SUBFILE LIST    UNID (7) DPT1 (19) DPT2 (9) DPT3 (7) DPT4 (29) DPT5 (11)
                 5                 DPT6 (39)
                 6 INPUT FORMAT    FIXED (3X,3(1X,F1.0),21X,F3.0,2(1X,F2.0),1X,F3.0,4X)

                  ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

                  VARIABLE  FORMAT  RECORD    COLUMNS

                  MBOPRIOR  F 1. 0       1      5-   5
                  FORMAT    F 1. 0       1      7-   7
                  MBOFUTUR  F 1. 0       1      9-   9
                  HRSFIRST  F 3. 0       1     31-  33
                  LEARN     F 2. 0       1     35-  36
                  DOCUMENT  F 2. 0       1     38-  39
                  HRSNEXT   F 3. 0       1     41-  43

THE INPUT FORMAT PROVIDES FOR    7 VARIABLES.    7 WILL BE READ
IT PROVIDES FOR  1 RECORDS ('CARDS') PER CASE.  A MAXIMUM OF    47 'COLUMNS' ARE USED ON A RECORD.

                 7 MISSING VALUES MBOPRIOR TO MDOFUTUR (0)/HRSFIRST,HRSNEXT(000)/
                 8                 LEARN,DOCUMENT(00)/
                 9 VALUE LABELS    MBOPRIOR (6)MBO USER (7)NON USER (0)MISSING/
                10                 FORMAT (6)MBO USED (7)FREE USED (0)MISSING/
                11                 MBOFUTUR (6)FUTURE USER (7)FUTURE NON USER (0)MISSING/
                12 VAR LABELS      MBOPRIOR PREVIOUS MBO USER/
                13                 FORMAT FORMAT USED FOR R&O WITH ZBB/
                14                 MBOFUTUR INTENDED FUTURE USE OF ZBB/
                15                 HRSFIRST HRS SPENT FIRST ZBB/
                16                 LEARN PERCENT TIME SPENT LEARNING ZBB/
                17                 DOCUMENT PERCENT TIME SPENT DOCUMENTING ZBB/
                18                 HRSNEXT EST HRS ZBB WILL REQUIRE NEXT TIME/
                19 TASK NAME       TEST OF MEANS FOR HYPOTHESIS THREE
                20 SELECT IF       (LEARN GT 00)
                21 SELECT IF       (DOCUMENT GT 00)
                22 SELECT IF       (HRSFIRST GT 000)
                23 COMPUTE         LEARNHRS=(LEARN*HRSFIRST)/100
                24 COMPUTE         DOCUMHRS=(DOCUMENT*HRSFIRST)/100
                25 VAR LABELS      LEARNHRS HRS REQUIRED TO LEARN ZBB/
                26                 DOCUMHRS HRS REQUIRED TO DOCUMENT ZBB/
                27 RUN SUBFILES    (DPT1)(DPT2)(DPT3)(DPT4)(DPT5)(DPT6)
                28 T-TEST          GROUPS=MBOPRIOR(6,7)/VARIABLFS=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES     208 BYTES OF WORKSPACE *****
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                                        03/28/83        PAGE    2  Appendix H
FILE    MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS                                      Department 1
SUBFILE    DPT1                                                                                                       MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.

                                                                   *  POOLED VARIANCE ESTIMATE  *  SEPARATE VARIANCE ESTIMATE
VARIABLE         NUMBER                STANDARD   STANDARD  *                  *                               *
               OF CASES      MEAN      DEVIATION     ERROR   *   F     2-TAIL  *    T    DEGREES OF  2-TAIL  *    T     DEGREES OF   2-TAIL
                                                             *  VALUE  PROB.   *  VALUE   FREEDOM    PROB.   *  VALUE    FREEDOM     PROB.
-------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB
    GROUP 1         6      46.8333      51.503     21.026    *                 *                             *
                                                              *  7.23  0.005   *   0.49      17      0.632   *   0.36      5.65       0.733
    GROUP 2        13      39.0769      19.159      5.314    *                 *                             *
-------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB
    GROUP 1         6      13.0833      16.101      6.573    *                 *                             *
                                                              *  9.21  0.002   *   0.88      17      0.390   *   0.63      5.51       0.550
    GROUP 2        13       8.8154       5.305      1.471    *                 *                             *
-------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB
    GROUP 1         6       8.6750       6.818      2.783    *                 *                             *
                                                              *  2.50  0.321   *  -0.89      17      0.387   *  -1.05     14.91       0.310
    GROUP 2        13      12.9615      10.772      2.988    *                 *                             *
-------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME
    GROUP 1         6      32.3333      33.833     13.812    *                 *                             *
                                                              *  6.63  0.007   *   0.66      17      0.520   *   0.49      5.71       0.644
    GROUP 2        13      25.3846      13.144      3.645    *                 *                             *
-------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                                                03/28/83        PAGE    3  Appendix H
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                          Department 2
SUBFILE   DPT2                                                                                                              MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                            * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                 *                  *                           *
VARIABLE          NUMBER                 STANDARD      STANDARD  *    F     2-TAIL  *    T    DEGREES OF 2-TAIL *    T    DEGREES OF  2-TAIL
                 OF CASES       MEAN     DEVIATION       ERROR   *  VALUE   PROB.   *  VALUE    FREEDOM   PROB. *  VALUE    FREEDOM    PROB.
---------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST   HRS SPENT FIRST ZBB                                   *                  *                           *
     GROUP 1         7       101.4286     86.106       32.545    *                  *                           *
                                                                 *  0.00    1.000   *   0.71       6     0.504  *   2.01      6.00      0.091
     GROUP 2         1        36.0000      0.000        0.000    *                  *                           *
                                                                 *                  *                           *
---------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS   HRS REQUIRED TO LEARN ZBB                             *                  *                           *
     GROUP 1         7        34.9286     21.925        8.287    *                  *                           *
                                                                 *  0.00    1.000   *   0.26       6     0.802  *   0.74      6.00      0.487
     GROUP 2         1        28.8000      0.000        0.000    *                  *                           *
                                                                 *                  *                           *
---------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS   HRS REQUIRED TO DOCUMENT ZBB                          *                  *                           *
     GROUP 1         7        35.4286     19.890        7.518    *                  *                           *
                                                                 *  0.00    1.000   *   0.31       6     0.766  *   0.88      6.00      0.412
     GROUP 2         1        28.8000      0.000        0.000    *                  *                           *
                                                                 *                  *                           *
---------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT    EST HRS ZBB WILL REQUIRE NEXT TIME                    *                  *                           *
     GROUP 1         7        64.2857     39.521       14.938    *                  *                           *
                                                                 *  0.00    1.000   *   0.95       6     0.377  *   2.70      6.00      0.036
     GROUP 2         1        24.0000      0.000        0.000    *                  *                           *
                                                                 *                  *                           *
---------------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                                    03/28/83        PAGE    4 Appendix H
TEST OF MEANS FOR HYPOTHESIS THREE
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS                                                Department 3
SUBFILE   DPT3                                                                                                                 MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                             * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                   *                                   *
VARIABLE           NUMBER                STANDARD      STANDARD    *      F   2-TAIL *     T   DEGREES OF  2-TAIL *     T   DEGREES OF   2-TAIL
                 OF CASES       MEAN     DEVIATION       ERROR     *  VALUE   PROB.  *  VALUE    FREEDOM    PROB. *  VALUE    FREEDOM     PROB.
-----------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                      *                 *                            *
     GROUP 1         2       37.0000      32.527        23.000     *                 *                            *
                                                                   *   1.84  0.493   *  -1.53       5      0.186  *  -1.31      1.46       0.415
     GROUP 2         5       70.2000      23.983        10.726     *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                                *                 *                            *
     GROUP 1         2        6.5000       0.707         0.500     *                 *                            *
                                                                   * 269.76  0.091   *  -1.05       5      0.340  *  -1.76      4.07       0.154
     GROUP 2         5       15.6700      11.614         5.194     *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                             *                 *                            *
     GROUP 1         2       27.5000      28.991        20.500     *                 *                            *
                                                                   *   4.28  0.215   *   0.50       5      0.636  *   0.35      1.19       0.783
     GROUP 2         5       19.9100      14.011         6.266     *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                       *                 *                            *
     GROUP 1         2       33.0000      38.184        27.000     *                 *                            *
                                                                   *   4.56  0.199   *  -0.77       5      0.478  *  -0.53      1.18       0.688
     GROUP 2         5       48.0000      17.889         8.000     *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------------
```

Appendix H

Department 4
MBOPRIOR

```
SPSS BATCH SYSTEM                                                                                 03/28/83         PAGE    5
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT4

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ            6.
GROUP 2 - MBOPRIOR EQ            7.
                                                                         * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                                 *                                  *
VARIABLE        NUMBER               STANDARD    STANDARD   *    F    2-TAIL *    T    DEGREES OF  2-TAIL *    T    DEGREES OF   2-TAIL
               OF CASES     MEAN     DEVIATION     ERROR    *  VALUE  PROB.  *  VALUE   FREEDOM    PROB.  *  VALUE   FREEDOM     PROB.
----------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                               *                *                            *
    GROUP 1        13      91.2308    162.482     45.064    *                *                            *
                                                            * 217.41  0.000  *   0.92      19      0.367  *   1.19     12.18      0.258
    GROUP 2         8      37.5000     11.019      3.896    *                *                            *
                                                            *                *                            *
----------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                         *                *                            *
    GROUP 1        13       8.6331      7.682      2.131    *                *                            *
                                                            *   1.42  0.568  *  -0.39      19      0.704  *  -0.37     12.97      0.718
    GROUP 2         8      10.0625      9.146      3.234    *                *                            *
                                                            *                *                            *
----------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                      *                *                            *
    GROUP 1        13      49.3231     98.636     27.357    *                *                            *
                                                            *  91.28  0.000  *   1.02      19      0.319  *   1.31     12.42      0.215
    GROUP 2         8      13.1563     10.324      3.650    *                *                            *
                                                            *                *                            *
----------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                *                *                            *
    GROUP 1        13      94.4615    203.260     56.374    *                *                            *
                                                            * 555.22  0.000  *   0.97      19      0.343  *   1.25     12.07      0.235
    GROUP 2         8      23.8750      8.626      3.050    *                *                            *
                                                            *                *                            *
----------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                               03/28/83        PAGE    6  Appendix H
FILE   MBA      (CREATION DATE = 03/28/83)   THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   DPTS                                                                                              Department 5
                                                                                                            MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ        6.
GROUP 2 - MBOPRIOR EQ        7.

                                                               *                 * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE         NUMBER               STANDARD    STANDARD     *                 *                          *
                OF CASES     MEAN     DEVIATION     ERROR      *   F    2-TAIL   *   T    DEGREES OF 2-TAIL *   T    DEGREES OF  2-TAIL
                                                               * VALUE  PROB.    * VALUE   FREEDOM   PROB.  * VALUE   FREEDOM    PROB.
---------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                  *                 *                          *
    GROUP 1        6       183.3333    156.290     63.805      *                 *                          *
                                                               *  3.56  0.325    *  0.84     8      0.424   *  0.95     7.79      0.368
    GROUP 2        4       110.7500     82.839     41.419      *                 *                          *
---------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                            *                 *                          *
    GROUP 1        6        47.7500     38.992     15.918      *                 *                          *
                                                               * 19.49  0.034    *  1.82     8      0.106   *  2.23     5.74      0.068
    GROUP 2        4        10.9750      8.832      4.416      *                 *                          *
---------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                         *                 *                          *
    GROUP 1        6        57.1667     42.216     17.234      *                 *                          *
                                                               *  3.39  0.343    *  0.65     8      0.536   *  0.73     7.84      0.486
    GROUP 2        4        42.0500     22.915     11.458      *                 *                          *
---------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                   *                 *                          *
    GROUP 1        5       133.0000    121.943     54.534      *                 *                          *
                                                               *  2.09  0.570    *  0.44     7      0.673   *  0.46     6.92      0.659
    GROUP 2        4       101.2500     84.299     42.149      *                 *                          *
---------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                                          03/28/83         PAGE    7 Appendix H
FILE     MBA      (CREATION DATE = 03/28/83)     THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE     DPT6                                                                                                          Department 6
                                                                                                                          MBOPRIOR
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - MBOPRIOR EQ          6.
GROUP 2 - MBOPRIOR EQ          7.
                                                                         * POOLED VARIANCE ESTIMATE  * SEPARATE VARIANCE ESTIMATE
VARIABLE          NUMBER                STANDARD      STANDARD   *                               *
                 OF CASES     MEAN     DEVIATION        ERROR    *   F     2-TAIL *    T    DEGREES OF 2-TAIL *    T    DEGREES OF   2-TAIL
                                                                 * VALUE    PROB.  *  VALUE   FREEDOM   PROB. *  VALUE   FREEDOM     PROB.
-------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB
     GROUP 1       18       52.3333      42.711       10.067     *                 *                          *
                                                                 *  1.05  0.924    *   0.71      34    0.481  *   0.71     33.98     0.481
     GROUP 2       18       42.0556      43.731       10.308     *                 *                          *
-------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB
     GROUP 1       18       16.9167      21.741        5.124     *                 *                          *
                                                                 *  3.93  0.007    *   0.96      34    0.342  *   0.96     25.12     0.344
     GROUP 2       18       11.3833      10.963        2.584     *                 *                          *
-------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB
     GROUP 1       18       19.0694      22.069        5.202     *                 *                          *
                                                                 *  1.34  0.552    *   0.41      34    0.682  *   0.41     33.30     0.682
     GROUP 2       18       16.2250      19.062        4.493     *                 *                          *
-------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME
     GROUP 1       17       33.5294      25.916        6.286     *                 *                          *
                                                                 *  2.69  0.050    *   1.74      33    0.091  *   1.72     26.16     0.098
     GROUP 2       18       21.0000      15.789        3.722     *                 *                          *
-------------------------------------------------------------------------------------------------------------------------------------
```

Appendix H

Department 1

FORMAT

```
SPSS BATCH SYSTEM                                                                    03/28/83        PAGE     8
TEST OF MEANS FOR HYPOTHESIS THREE

TRANSPACE REQUIRED..       500 BYTES
     5 TRANSFORMATIONS
     0 RECODE VALUES + LAG VARIABLES
    17 IF/COMPUTE OPERATIONS

CPU TIME REQUIRED..     4.28 SECONDS


            29 T-TEST          GROUPS=FORMAT(6,7)/VARIABLES=HRSFIRST,LEARNHRS,DOCUMHRS,HRSNEXT

 ***** T-TEST PROBLEM REQUIRES    208 BYTES OF WORKSPACE *****


- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                                   03/28/83        PAGE     9
FILE    MOA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT1

- - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT   EQ          6.
GROUP 2 - FORMAT   EQ          7.
                                                                       * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE            NUMBER              STANDARD     STANDARD  *                 *                                *
                   OF CASES.    MEAN    DEVIATION      ERROR   *   F     2-TAIL  *    T    DEGREES OF  2-TAIL  *    T    DEGREES OF   2-TAIL
                                                               *  VALUE   PROB.  *  VALUE    FREEDOM    PROB.  *  VALUE    FREEDOM     PROB.
----------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                  *                 *                             *
     GROUP 1         9       44.1111       43.942     14.647   *                 *                             *
                                                               *  7.38  0.007    *   0.33       17      0.745  *   0.32      9.94      0.758
     GROUP 2        10       39.2000       16.171      5.114   *                 *                             *
                                                               *                 *                             *
----------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                            *                 *                             *
     GROUP 1         9       11.0667       13.377      4.459   *                 *                             *
                                                               *  6.12  0.014    *   0.37       17      0.713  *   0.36     10.33      0.727
     GROUP 2        10        9.3500        5.408      1.710   *                 *                             *
                                                               *                 *                             *
----------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                         *                 *                             *
     GROUP 1         9        8.5278        7.443      2.481   *                 *                             *
                                                               *  2.20  0.282    *  -1.34       17      0.198  *  -1.37     15.85      0.190
     GROUP 2        10       14.3800       11.030      3.488   *                 *                             *
                                                               *                 *                             *
----------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                   *                 *                             *
     GROUP 1         9       32.6667       28.156      9.385   *                 *                             *
                                                               *  5.90  0.016    *   1.00       17      0.332  *   0.96     10.41      0.360
     GROUP 2        10       23.0000       11.595      3.667   *                 *                             *
                                                               *                 *                             *
----------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                                          03/28/83        PAGE   10 Appendix H
FILE    MBA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE   DPT2                                                                                                  Department 2
                                                                                                                FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - -
GROUP 1 - FORMAT    EQ         6.
GROUP 2 - FORMAT    EQ         7.
                                                                       * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE          NUMBER                STANDARD    STANDARD  *                 *                                 *
                 OF CASES     MEAN      DEVIATION     ERROR   *  F     2-TAIL  *   T   DEGREES OF 2-TAIL *   T    DEGREES OF   2-TAIL
                                                              * VALUE  PROB.   * VALUE   FREEDOM   PROB. * VALUE   FREEDOM     PROB.
------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                 *                *                          *
     GROUP 1         5      110.0000     103.923     46.476   *                *                          *
                                                              * 16.74  0.114   *  0.71      6     0.504  *  0.92      4.74       0.401
     GROUP 2         3       65.3333      25.403     14.667   *                *                          *
------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                           *                *                          *
     GROUP 1         5       34.5000      26.688     11.935   *                *                          *
                                                              * 21.40  0.090   *  0.06      6     0.957  *  0.07      4.59       0.945
     GROUP 2         3       33.6000       5.769      3.331   *                *                          *
------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                        *                *                          *
     GROUP 1         5       30.4000      21.232      9.495   *                *                          *
                                                              *  2.41  0.628   * -0.81      6     0.451  * -0.91      5.85       0.399
     GROUP 2         3       41.6000      13.670      7.893   *                *                          *
------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                  *                *                          *
     GROUP 1         5       48.0000      47.645     21.307   *                *                          *
                                                              *  6.57  0.273   *  0.79      6     0.459  *  0.98      5.57       0.366
     GROUP 2         3       44.6667      18.583     10.729   *                *                          *
------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                                            03/28/83        PAGE   11 Appendix H
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                       Department 3
SUBFILE    DPT3                                                                                                          FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ         6.
GROUP 2 - FORMAT    EQ         7.
                                                                      * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE           NUMBER                STANDARD    STANDARD  *                 *
                  OF CASES     MEAN     DEVIATION      ERROR   *   F    2-TAIL   *    T    DEGREES OF  2-TAIL *    T    DEGREES OF   2-TAIL
                                                               *  VALUE  PROB.   *  VALUE    FREEDOM   PROB.  *  VALUE    FREEDOM     PROB.
-----------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                  *                 *                            *
     GROUP 1         3       41.3333     24.194      13.968    *                 *                            *
                                                               *   1.02  1.000   *  -1.82       5      0.128  *  -1.83      4.48       0.142
     GROUP 2         4       75.2500     24.432      12.216    *                 *                            *
                                                               *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                            *                 *                            *
     GROUP 1         3        8.5000      3.500       2.021    *                 *                            *
                                                               *  14.34  0.132   *  -0.99       5      0.366  *  -1.15      3.54       0.314
     GROUP 2         4       16.4625     13.254       6.627    *                 *                            *
                                                               *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                         *                 *                            *
     GROUP 1         3       30.8333     21.297      12.296    *                 *                            *
                                                               *   3.42  0.337   *   1.24       5      0.270  *   1.13      2.88       0.341
     GROUP 2         4       15.5125     11.525       5.762    *                 *                            *
                                                               *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                   *                 *                            *
     GROUP 1         3       32.0000     27.055      15.620    *                 *                            *
                                                               *   2.51  0.458   *  -1.24       5      0.270  *  -1.15      3.18       0.333
     GROUP 2         4       52.5000     17.078       8.539    *                 *                            *
                                                               *                 *                            *
-----------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                         03/28/83         PAGE   12 Appendix H
TEST OF MEANS FOR HYPOTHESIS THREE                                                                                    Department 4
FILE    MOA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS
SUBFILE    DPT4                                                                                                       FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ        6.
GROUP 2 - FORMAT    EQ        7.
                                                                        * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
                                                             *                                     *
VARIABLE          NUMBER                STANDARD    STANDARD *    F    2-TAIL *     T   DEGREES OF 2-TAIL *     T   DEGREES OF   2-TAIL
                 OF CASES      MEAN    DEVIATION       ERROR *  VALUE  PROB.  *  VALUE   FREEDOM   PROB.  *  VALUE   FREEDOM     PROB.
----------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST  HRS SPENT FIRST ZBB                                *               *                          *
     GROUP 1        10       111.8000    182.007      57.556 *               *                          *
                                                             * 199.23  0.000 *    1.43     19     0.170 *   1.36     9.08       0.207
     GROUP 2        11        33.4545     12.895       3.888 *               *                          *
                                                             *               *                          *
----------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS  HRS REQUIRED TO LEARN ZBB                          *               *                          *
     GROUP 1        10        12.4180     10.231       3.235 *               *                          *
                                                             *   6.49  0.007 *    1.86     19     0.079 *   1.79    11.50       0.101
     GROUP 2        11         6.2318      4.017       1.211 *               *                          *
                                                             *               *                          *
----------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS  HRS REQUIRED TO DOCUMENT ZBB                       *               *                          *
     GROUP 1        10        62.2200    110.323      34.887 *               *                          *
                                                             * 143.36  0.000 *    1.53     19     0.143 *   1.46     9.11       0.180
     GROUP 2        11        11.2955      9.214       2.778 *               *                          *
                                                             *               *                          *
----------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT   EST HRS ZBB WILL REQUIRE NEXT TIME                 *               *                          *
     GROUP 1        10       115.1000    230.199      72.795 *               *                          *
                                                             * 575.65  0.000 *    1.31     19     0.206 *   1.25     9.03       0.244
     GROUP 2        11        24.3636      9.595       2.893 *               *                          *
                                                             *               *                          *
----------------------------------------------------------------------------------------------------------------------------------------
```

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SPSS BATCH SYSTEM                                                                          03/28/83        PAGE   13  Appendix H
TEST OF MEANS FOR HYPOTHESIS THREE
FILE    MDA      (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                                        Department 5
SUBFILE   DPT5                                                                                                           FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ         6.
GROUP 2 - FORMAT    EQ         7.
                                                                                 * POOLED VARIANCE ESTIMATE  * SEPARATE VARIANCE ESTIMATE
VARIABLE           NUMBER                STANDARD     STANDARD *    F    2-TAIL *    T    DEGREES OF 2-TAIL *    T    DEGREES OF  2-TAIL
                  OF CASES      MEAN     DEVIATION      ERROR  *  VALUE   PROB. *  VALUE    FREEDOM   PROB. *  VALUE    FREEDOM    PROB.
-----------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST   HRS SPENT FIRST ZBB                                 *                *                           *
     GROUP 1          3     219.3333     250.602     144.685   *                *                           *
                                                               *  36.27  0.000  *   1.07       9     0.311  *   0.62       2.04      0.599
     GROUP 2          8     129.3750      41.614      14.713   *                *                           *
-----------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS   HRS REQUIRED TO LEARN ZBB                           *                *                           *
     GROUP 1          3      44.3000      69.955      40.388   *                *                           *
                                                               *  41.45  0.000  *   0.64       9     0.537  *   0.37       2.04      0.748
     GROUP 2          8      29.3750      10.865       3.841   *                *                           *
-----------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS   HRS REQUIRED TO DOCUMENT ZBB                        *                *                           *
     GROUP 1          3      64.2333      57.097      32.965   *                *                           *
                                                               *   4.97  0.091  *   0.95       9     0.368  *   0.66       2.31      0.577
     GROUP 2          8      41.6875      25.611       9.055   *                *                           *
-----------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT    EST HRS ZBB WILL REQUIRE NEXT TIME                  *                *                           *
     GROUP 1          3     168.3333     169.288      97.738   *                *                           *
                                                               *  10.65  0.021  *   1.03       8     0.332  *   0.69       2.16      0.564
     GROUP 2          7     100.0000      51.881      19.609   *                *                           *
-----------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM
TEST OF MEANS FOR HYPOTHESIS THREE                                                   03/28/83          PAGE   14 Appendix H
FILE    MBA       (CREATION DATE = 03/28/83)    THESIS STATISTICAL SURVEY ANALYSIS                               Department 6
SUBFILE    DPT6                                                                                                  FORMAT
- - - - - - - - - - - - - - - - - - - - - - - - - - T - T E S T - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

GROUP 1 - FORMAT    EQ          6.
GROUP 2 - FORMAT    EQ          7.
                                                                        * POOLED VARIANCE ESTIMATE * SEPARATE VARIANCE ESTIMATE
VARIABLE              NUMBER                  STANDARD     STANDARD  *                          *
                     OF CASES      MEAN      DEVIATION       ERROR   *   F     2-TAIL *    T    DEGREES OF  2-TAIL *    T     DEGREES OF   2-TAIL
                                                                      * VALUE   PROB.  *  VALUE    FREEDOM    PROB.  *  VALUE    FREEDOM      PROB.
-------------------------------------------------------------------------------------------------------------------------------------------------
HRSFIRST   HRS SPENT FIRST ZBB                                        *                 *                            *
    GROUP 1          15          51.6000       29.852        7.708  *                 *                            *
                                                                      *  2.96   0.042  *   0.28      34      0.778  *   0.31     32.88       0.758
    GROUP 2          21          47.3810       51.380       11.212  *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------------
LEARNHRS   HRS REQUIRED TO LEARN ZBB                                  *                 *                            *
    GROUP 1          15          11.7667        9.412        2.430  *                 *                            *
                                                                      *  5.05   0.003  *  -0.88      34      0.387  *  -0.98     29.39       0.333
    GROUP 2          21          16.9000       21.156        4.617  *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------------
DOCUMHRS   HRS REQUIRED TO DOCUMENT ZBB                               *                 *                            *
    GROUP 1          15          16.3700       14.595        3.768  *                 *                            *
                                                                      *  2.83   0.051  *  -0.54      34      0.591  *  -0.59     33.10       0.560
    GROUP 2          21          20.2262       24.569        5.361  *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------------
HRSNEXT    EST HRS ZBB WILL REQUIRE NEXT TIME                         *                 *                            *
    GROUP 1          15          35.0667       24.705        6.379  *                 *                            *
                                                                      *  1.54   0.376  *   1.65      33      0.108  *   1.60     26.35       0.121
    GROUP 2          20          22.6000       19.906        4.451  *                 *                            *
-------------------------------------------------------------------------------------------------------------------------------------------------
```

```
SPSS BATCH SYSTEM                                                          03/28/83        PAGE   15  Appendix H
TEST OF MEANS FOR HYPOTHESIS THREE
                30 READ INPUT DATA

CPU TIME REQUIRED..     1.25 SECONDS


               31 FINISH

          NORMAL END OF JOB.
             31 CONTROL CARDS WERE PROCESSED.
              0 ERRORS WERE DETECTED.
```